PB90-153719

Superfund Record of Decision (EPA Region 5)
Big D Campground, Kingsville, OH
(First Remedial Action), September 1989

(U.S.) Environmental Protection Agency, Washington, DC

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16. Abstract (Limit: 200 words)

The Big D Campground site is in Kingsville, Ashtabla County, Ohio. The site consists of a 1.2-acre landfill created out of a former sand and gravel quarry. From 1964 to 1976 the site owner accepted approximately 28,000 cubic yards of hazardous materials for disposal which included up to 5,000 drums containing solvents, caustics, and oily substances. A 1986 remedial investigation identified the landfill as the primary source of contamination in soil outside the landfill and ground water underlying the landfill. Ground water contamination is of significant concern because it is migrating towards the drinking water supply wells of nearby residences and Conneaut Creek which is adjacent to and south of the site. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE, other organics, and metals including chromium and lead.

The selected remedial action for this site includes removing and incinerating up to 5,000 buried drums, bulk wastes, and up to 30,000 cubic yards of contaminated soil followed by onsite disposal of nonhazardous ash residue; pumping and treatment of 40,000,000 to 60,000,000 gallons of ground water using an onsite granular activated carbon system followed by onsite discharge to Conneaut Creek; and ground water and surface water monitoring. The estimated present worth cost for this remedial action is $39,000,000, which includes annual O&M costs of $320,000.

17. Document Analysis a. Descriptors

Record of Decision - Big D Campground, OH
First Remedial Action - Final
Contaminated Media: soil, gw
Key Contaminants: VOCs (PCE, TCE), other organics, metals (chromium)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

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OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

Record of Decision

DECLARATION

SITE NAME AND LOCATION

Big D Campground
Kingsville, Ohio

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Big D Campground site in Kingsville, Ohio, developed in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

The State of Ohio has concurred on the selected remedy.

ASSESSMENT OF SITE

The site consists of a drum and bulk waste disposal area created in a former sand and gravel quarry. Up to 5,000 drums and 30,000 cubic yards of bulk wastes are believed to be buried at the site. Ground water in contact with these wastes is migrating towards nearby residences to the north and into the Conneaut Creek adjacent to and south of the site. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

The selected remedy addresses all risks posed by contamination in the source area (landfill) and ground water. The source area will be excavated and incinerated and the ground water will be collected and treated.

The major components of the remedy include:

- Deed restriction
- Site fencing
- Source area excavation
- Incineration on-site
- Disposal of treated material and backfilling on site
- Ground water collection
- Ground water treatment on-site
- Discharge of treated ground water to Conneaut Creek
- Ground water and surface water monitoring

DECLARATION

The selected remedy is protective of human health and the environment, a waiver can be justified for whatever Federal and state applicable or relevant and appropriate requirement that will not be met, and is cost effective. This remedy satisfies the statutory preference for remedies that employ treatment, reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Because this remedy will result in hazardous substances remaining on-site, the five-year facility review will apply to this action.

Valdas V. Adamkus

Valdas V. Adamkus
Regional Administrator
U.S. EPA, Region V

Sept. 29th, 1989.
Date

ROD DECISION SUMMARY

I. Site Name, Location and Description

The Big D Campground ("Big D") site is located in Kingsville, Ashtabula County, Ohio, approximately 2.5 miles south of Lake Erie and 50 miles northeast of Cleveland. The site is located south of Creek Road, north of Conneaut Creek and west of, and adjacent to, "Big D Kampground" (see Figure 1).

The landfill at the site is approximately 1.2 acres in size and approximately 20 feet deep. The landfill is located on a relatively level surface which gently slopes north towards Lake Erie. Approximately 50 feet south of the southern edge of the landfill the land slopes sharply towards Conneaut Creek (approximate 32% slope).

The site is bordered by Conneaut Creek to the south, a campground to the southeast, open land to the west, residences with small acreage to the north and northwest, and a swamp area approximately 1/2 mile to the north. The residences are located approximately 500 feet north of the site.

Residences within 1/2 mile of the site, north of Conneaut Creek, use ground water for drinking.

II. Site History and Enforcement Activities

The Big D Campground site was initially operated as a sand and gravel quarry which was subsequently filled with hazardous and non-hazardous materials. The active disposal period lasted from 1964-1976.

Most of the materials placed in the landfill were drummed, but some bulk toluene diisocyanate (TDI) was also disposed. It is estimated that 2500 to 5000 drums are buried at the site. The drummed hazardous materials include non-halogenated and halogenated solvents, caustics and oily substances. Other wastes believed to have been disposed of at the site include: spent vacuum pump oil, TDI residue contaminated with monochlorobenzene (MCB) and carbon tetrachloride, earth contaminated with diaminotoluene (TDA) and TDI, flyash, trash, monoethanolamine (MEA), off-specification TDI, and TDA and TDI in sample cans and bottles. The vacuum pump oil may have been contaminated with TDI, MCB and trace levels of phosgene. The total volume of hazardous substances disposed of at the site is approximately 28,000 cubic yards.

Preliminary investigations began at the site in 1982. As early as 1982, the major PRP at the site was sent information on these investigations. In December, 1982 the site was proposed for the National Priorities List (NPL) of Superfund sites. On September 8, 1983, the site became final on the NPL. Olin Chemicals Corporation, a major PRP at the site, made comments on this proposed listing in February of 1983. In April 1985, notice letters were sent to three PRPs; Olin Chemicals Corporation (generator), Brenkus Construction

Co. (operator), and Mr. Dreslinski (current site owner). Olin was sent a CERCLA Section 104(e) information request at approximately the same time, to which they responded in July 1985.

Olin's response indicated that they were a substantial contributor of hazardous substances to the Site and would be the focus of RI/FS negotiations. In November 1985, a reminder that notice had been provided and a draft scope of work for the RI/FS was sent to the potentially responsible parties (PRPs). In December 1985, negotiations to conduct the RI/FS began with Olin, the only PRP to respond positively to EPA's request. In early January 1986, technical questions arose and EPA reiterated that a consent order would need to be agreed upon by February 15, 1986 for Olin to conduct the RI/FS. No agreement was reached and EPA terminated the RI/FS negotiation period shortly after February 15, 1986.

Olin continued to be interested in the remediation process and sent letters protesting the termination of the negotiations. Among these was a counter-proposal to do the RI/FS delivered to the Regional Administrator.

The fund-financed RI began in late 1986 and was completed in mid-1988. The final RI, FS and Proposed Plan were released for public comment on July 28, 1989. A public meeting to discuss these documents was held on August 8, 1989. The public comment period ended on August 26, 1989.

Special Notice for RD/RA negotiations will be issued to PRPs before September 30, 1989.

III. Community Relations History

On August 14-15, 1986 Community Relations personnel from the U.S. EPA and ICF Technologies, Inc. travelled to Cleveland, Ohio and drove to the towns of Mentor, Jefferson and Kingsville, Ohio, where they met with and interviewed County and Township officials and residents.

A Fact Sheet was distributed to the public in December, 1986 which discussed the RI scheduled to begin that month. A RI kickoff public meeting was held on February 5, 1987.

On July 28, 1989 the Final RI report, FS report and Proposed Plan were released to the public for comment. The PRPs were sent a copy of the FS and Proposed Plan on July 27, 1989. A public meeting was held on August 8, 1989, in Kingsville, Ohio, to discuss the RI, FS and Proposed Plan, and to receive official comments on the Proposed Plan. The public comment period ended August 26, 1989. Comments received and responses to comments are addressed in the Responsiveness Summary.

IV. Scope and Role of Response Action

The remedial action will address the principal threats at the site; ground water contamination and the source area (landfill) contamination. The RI identified total cancer risks as high as 1×10^{-2} under worst case conditions for ingestion of groundwater. Non-carcinogenic risks were also identified for ingestion of groundwater, based on worst case conditions.

The major source of contamination identified at the site is the landfill. Therefore the alternative chosen to remediate contamination at the site will address contamination in the ground water and source area. The site risk objectives will reduce health risks in the groundwater and the soils adjacent to the source area (which may pose a risk based on ingestion or direct contact) to a cumulative Hazard Index of 1.0 or less and a cumulative carcinogenic risk of 10^{-6} or less.

V. Summary of Site Characteristics

The RI investigated the contaminant source area (landfill), soils outside the source area, groundwater and surface water and sediment. Table 1 summarizes the maximum concentrations of indicator chemicals (see V. B. Fate and Transport, page 5) identified in different media at the site.

A. Nature and Extent of Contamination

Source Area

A geophysical survey was performed which indicated a rectangular trench in the northern area of the site (approximate size 1.2 acres). Based on the geophysical survey two test pits were excavated. These pits verified the presence of buried drums (intact and either partially crushed or ruptured), bulk waste and contaminated soil in the source area. Analytical results revealed that the same organic compounds found in the ground water and subsurface soil samples are also present in the source area, but at greater concentrations.

Soils (outside the source area)

The geologic investigation identified five geologic units at the site; three glacially deposited units, one alluvial unit and one bedrock unit. At the upper (northern) portion of the site, the three glacial units overlay bedrock. These three units are not present at the lower (southern) portion of the site where bedrock is overlain by alluvial deposits (see Figure 2).

Surface and subsurface soil samples were collected from nine on-site locations surrounding the source area. Inorganic compounds were detected in isolated areas.

Organic compounds were detected in the soils. Chlorobenzene was the organic compound detected most frequently and at the highest concentrations.

Ground Water

Five hydrogeologic units, which correspond to the site geology described above, were identified at the site; three aquifers and two aquitards. The units present at the upper portion of the site are the water table aquifer (uppermost), the silt-clay aquitard, the hard grey clay till aquitard, and the bedrock aquifer. The units present at the lower portion of the site are the alluvial aquifer and the bedrock aquifer (see Figure 2).

At the upper portion of the site the water table aquifer is hydraulically separated from the bedrock aquifer. At the lower portion of the site the alluvial aquifer and the semi-confined aquifer are hydraulically connected.

Ground water in the water table aquifer at the upper portion of the site flows both north and south. The approximate location of the ground water divide occurs at the southern edge of the landfill. Ground water flows north towards local discharge points and flows south toward Conneaut Creek. The confined bedrock aquifer locally flows south to Conneaut Creek.

Two rounds of ground water sampling were conducted at wells around the source area, wells located south of the source area near the creek and six off-site residential wells. Shallow wells on-site and near the creek showed concentrations of inorganic contaminants above background levels. Deep on-site wells also have concentrations of some inorganic constituents above background levels.

Organic indicator compounds were detected in shallow on-site wells and wells near the creek. The indicator chemicals (see V. B. Fate and Transport, p. 5) detected include chlorobenzene, 1,2- and 1,4-dichlorobenzene, trans-1,2-dichlorobenzene, diaminotoluene, tetrachloroethene, trichloroethene and vinyl chloride. Deep wells on-site detected organic compounds at low concentrations. This indicates the possibility of vertical contaminant migration through the aquitard at localized areas.

Compounds found in creek wells (lower portion of the site) were the same as those found in shallow wells (upper portion of the site) however the concentrations in the creek wells were considerably less.

One of the six residential wells sampled showed concentrations of inorganic contaminants similar to wells on site. This residential well is not used by the owner but was sampled due to its proximity to the site. The source of the inorganic contamination is probably the site. However, the aquifer from which the residential well is drawing water appears to be above and separate from the water table aquifer in which on-site monitoring wells are located. Past fluctuations in the ground water levels of the water table aquifer could have caused inorganic contamination to migrate into the perched aquifer.

Organic compounds were detected in one of six residential wells (the Dreslinski campground well). This well had been chlorinated with Chlorox Bleach shortly before the sampling occurred. This chlorination is probably the source of chloroform (12 ug/1), bromo-dichloromethane (2 ug/1) and dibromochloromethane (2 ug/1) identified in the sample from that well.

Surface Water and Sediment

Inorganic contamination in the surface water was detected in Conneaut Creek. However, the concentrations of manganese, magnesium, sodium and calcium were only slightly elevated above background levels.

Organic analytical results indicate the presence of chlorobenzene in Conneaut Creek. The concentrations are much lower than those detected in the ground water and lower than applicable regulatory standards.

Inorganic and organic contaminants were identified in the sediment near the site. The concentrations noted were only slightly above background levels.

B. Fate and Transport

Thirteen of the twenty-five contaminants identified in the source area, soils, ground water and surface water were identified as indicator chemicals. Indicator chemicals were chosen based on factors such as the number of times a chemical was detected, the maximum concentration, and persistence and toxicity to human health and the environment. The indicator chemicals at Big D Campground are listed below:

Inorganics	Organics
barium	chlorobenzene
beryllium	1,2-dichlorobenzene
chromium	1,4-dichlorobenzene
lead	trans-1,2-dichloroethene
nickel	diaminotoluene
	trichloroethene
	tetrachloroethene
	vinyl chloride

Inorganic Contaminants

Inorganic contaminants are present in the source area, surface soils, subsurface soils and ground water. Inorganics in the soils can (1) migrate to Conneaut Creek by runoff from surface soils and move with the Creek, eventually collecting as stream sediment, (2) migrate up from the saturated zone into the unsaturated zone due to fluctuating ground water levels, (3) remain attached to unsaturated subsurface soils, or (4) move with ground water from the source area and subsurface soils.

Inorganics in ground water in the water table aquifer are not expected to migrate to a significant degree, however, part of the source area is in the ground water. Ground water coming in contact with the source area can have contaminant concentrations as high as the solubility limit for specific compounds.

Inorganics present in the alluvial and bedrock aquifers may (1) attach to subsurface soils and not migrate, or (2) discharge to Conneaut Creek and decrease in concentration due to dilution or attaching to creek sediments.

Organic Contaminants

Organics were detected in the source area, surface soils, subsurface soils and ground water. Organics in the source area and soils can (1) migrate to Conneaut Creek by runoff from surface soils and volatilize or accumulate in stream sediments, and (2) migrate from the source area and soils into ground water by moving vertically via precipitation or fluctuating ground water levels (the bottom of the source area is located in ground water).

The major pathway for organic contaminant movement at the site is by ground water flow. Organics will generally move with the bulk ground water flow and the attachment to soils will be minimal because less than 10 percent silt and clay is present in the sandy water table aquifer; sands do not typically adsorb organics. Organics in the ground water can also diffuse upward from the ground water into the unsaturated zone soils or atmosphere.

Organics in the ground water can discharge into Conneaut Creek where the concentrations of organics will decrease due to dilution, attaching to sediments, sedimentation and aquatic uptake (ingestion). In addition, organic contaminants in the surface water may decrease due to volatilization.

VI. Summary of Site Risks

A. Summary of Exposure Assessment

Six site-specific exposure scenarios were identified:

-Ingestion of contaminated soil
-Direct contact with contaminated soil
-Ingestion of contaminated ground water
-Incidental ingestion of contaminated surface water
-Direct contact with contaminated surface water
-Ingestion of contaminated aquatic life

An exposure scenario based on contaminants in the source area was not evaluated. Limited sampling was conducted in the test pits excavated in the source area. The sampling in the source area was conducted only to get general information on the material in the landfill and to confirm that contaminants identified in the ground water and soils originated in the landfill. Any carcinogenic or non-carcinogenic risks identified through other exposure scenarios also apply to the source area. However the risks in the source area would be greater because the concentration of contaminants in the source area are greater.

Table 2 summarizes the six exposure scenarios identified and the populations associated with each.

B. Toxicity Assessment

This section summarizes significant adverse health effects to humans and the environment posed by the indicator chemicals at the Big D site.

Barium is well absorbed but less toxic than most other metals. Acute doses interfere with the function of all muscle tissue, producing a wide variety of effects. Chronic toxicity, except for lung lesions after inhalation and aquatic toxicity, are not well defined.

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PB90-153719

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-89/101
September 1989

EPA

Superfund Record of Decision:

Big D Campground, OH

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Beryllium is very poorly absorbed. It produces irritation at the contact point. Like barium, chronic toxicity, except for lung lesions after inhalation and aquatic toxicity, are poorly defined.

Most chromium toxicity is due to hexavalent chromium. The main effect of overdoses is irritation at the point of contact. Chronic inhalation of hexavalent chromium produces lung tumors. Other target organs are the kidney, blood forming tissues and liver. Chromium is also toxic to aquatic species.

Lead is fairly well absorbed and accumulates in the skeleton. The main toxic effects are on the nervous system. Lead poisoning in children can inhibit growth and produce permanent learning defects. Lead is toxic to fish, however toxicity decreases as water hardness increases.

Nickel is a poorly absorbed metal. The major toxic effects are irritation on contact and allergic sensitization. Inhalation causes respiratory tract tumors.

Chlorobenzene is absorbed after ingestion, absorbed from the lungs and not absorbed through the skin. Acute doses produce irritation and central nervous system depression. Repeated doses cause liver and kidney lesions. Chlorobenzene is moderately toxic to aquatic species.

1,2-dichlorobenzene and its isomer, 1,4-dichlorobenzene, are very similar in their biological effects, however the 1,2-isomer is usually more potent. Dichlorobenzene is well absorbed by all routes. Acute doses cause irritation, some central nervous system depression, blood toxicity and kidney lesions, but the main effect is liver toxicity. Chronic doses produce similar effects. Dichlorobenzene are more toxic to aquatic species than is chlorobenzene.

Few studies have been performed with trans-1,2-dichloroethene. Its main acute toxic effect is central nervous system depression. Repeated doses affect the liver with some lesser effects on other organs.

Trichloroethene is well absorbed after inhalation and ingestion but poorly absorbed through the skin. Acute doses produce central nervous system depression. Repeated doses produce liver, kidney and peripheral nervous system lesions as well as tumors. Trichloroethene is toxic to aquatic species but much less toxic than the metals of concern.

Tetrachloroethene is similar to trichloroethene but less potent as a central nervous system depressant. It produces liver and lung lesions and tumors in animals. Its toxicity to aquatic species is similar to that of trichloroethene.

Vinyl chloride is carcinogenic to humans and animals. Gaseous vinyl chloride is rapidly absorbed in the lungs and aqueous vinyl chloride is well absorbed from the gastrointestinal tract. Acute exposure produces central nervous system depression. Repeated exposure produces hepatoxicity. A few large doses or several small doses will produce a variety of effects in humans. In animal studies, vinyl chloride produced some fetotoxicity at very large doses but no teratogenesis. It is mutagenic in a number of in vitro and in vivo systems.

Diaminotoluene is well absorbed orally but less so dermally. Acute doses are irritating and discolor skin and hair. Diaminotoluene is a very potent sensitizer and produces blood and liver lesions. Chronic doses produce liver and other tumors.

C. Risk Characteristics

Using information presented in the previous sections, the actual or potential risks to human health or the environment, associated with contaminants at or released from the site, were assessed. The potential risks associated with each exposure scenario are discussed. Risk levels were calculated by using estimated exposure doses and risk factors established by U.S. EPA.

To determine the non-carcinogenic risks, a hazard index (HI) was calculated for each contaminant of concern for which an allowable chronic intake (AIC) has been established by the U.S. EPA. The HI is the ratio between the estimated exposure dose for each contaminant and the acceptable exposure level for that same contaminant. In all cases, the AIC was used to represent each contaminant's acceptable exposure.

Carcinogenic risks were evaluated in terms of upperbound excess lifetime cancer risks to children who ingest site soils from the upper or lower portions of the site under probable case and worst case conditions. These risks were calculated using the following equation:

Upperbound Excess
Lifetime Cancer Risk = (Average Lifetime Dose) x (Carcinogenic Potency Factor)

Recent U.S. EPA guidance indicates that the target carcinogenic risks resulting from exposures at a Superfund site may range from between 10^{-4} to 10^{-7}. U.S. EPA Region V has a risk policy that cancer risks of 10^{-6} or greater are generally considered unacceptable. Thus, remedial alternatives being considered should be able to reduce total potential carcinogenic risks to levels of 10^{-6} or less.

Table 3 presents a summary of the potential risks associated with the various scenarios evaluated. Potentially significant risks are defined as those with a Hazard Index of 1.0 or greater or a cancer risk of 10^{-6} or greater.

Risk characterization of ingestion of, and direct contact with, contaminated soils outside the source area did not identify any non-carcinogenic or total cancer risks (see Table 3).

Ingestion of ground water identified total cancer risks as high as $1x10^{-2}$ under worst case conditions from all three aquifers. The contaminants associated with these risks are 2,4-diaminotoluene, tetrachloroethene, trichloroethene and vinyl chloride. Trichloroethene contamination levels identified in ground water were up to 1500 times in excess of federal standards for drinking water. Non-carcinogenic risks, based on worst case exposure doses, were also identified for all three aquifers. The primary contaminants associated with these risks are chlorobenzene and tetrachloroethene.

Chlorobenzene contamination levels identified in ground water were up to 750 times in excess of federal standards for drinking water.

Risks associated with incidental ingestion of contaminated surface water, direct contact with contaminated surface water and ingestion of contaminated aquatic life were not evaluated. Minimal contamination was found in the surface water and the contamination detected which exceeded federal regulations (lead and beryllium) was only found in one downstream sample. Also, contamination detected in the surface water was only slightly above background values.

The potential risks to the environment were evaluated by focusing on the aquatic life in Conneaut Creek next to and downstream of the site. Data on bottom-dwelling populations collected from Conneaut Creek indicated that the biological community downstream of the site may be slightly impaired, however further extensive studies of the data would be required to confirm this. The water quality data were compared to the U.S. EPA's Ambient Water Quality Criteria and no significant impacts were detected. Therefore, releases of contamination from the site may be only slightly impacting Conneaut Creek at this time.

The proposed alterative to remediate contamination at the site will address contamination in the ground water and the source area. The site risk objectives will reduce health risks in the ground water and soils adjacent to the source area (which may pose a risk based on ingestion or direct contact) to a cumulative Hazard Index of 1.0 or less and a cumulative carcinogenic risk of 10^{-6} or less.

VII. Documentation of Significant Changes.

The selected remedy and the preferred alternative presented in the Proposed Plan is alternative number 9 - On-Site Incineration, Ground Water Treatment. There are no significant changes.

VIII. Description of Alternatives

Nine alternatives were evaluated in detail in the Feasibility Study. Alternatives numbers 2 through 5 were not in full compliance with ARARs because ground water treatment was not included. The FS details all nine alternatives. Alternative 1, the no-action alternative, was also not in compliance with ARARs, however it is being retained as a baseline for comparison to other alternatives. Therefore Alternative number 1 and numbers 6 through 9 are summarized below.

A. Alternative 1 - No Action

1. Treatment Components

No treatment will occur.

2. Containment Components

Wastes will not be contained.

3. Institutional Controls

Institutional controls will not be implemented.

4. Estimated Time for Implementation.

None

5. Estimated Capital, O&M, and Present Worth Costs

All costs are $0.

6. ARARs

This alternative does not comply with ARARs.

B. Alternative 6 - Source Area Containment, Treatment of Ground Water Outside the Contained Area.

1. Treatment Components

This alternative would collect ground water in the water table aquifer with two interceptor trenches. Ground water in the alluvial, semi-confined bedrock and confined bedrock aquifers would be collected with extraction wells. The ground water will be treated on-site in a granular activated carbon (GAC) system. However, should pilot testing during the design phase indicate that pretreatment, such as sand filtration, ozonation or air stripping, is needed to achieve necessary removal efficiencies of certain compounds, the system will be adjusted accordingly. The estimated volume of contaminated ground water is 40 to 70 million gallons.

After treatment the effluent will be discharged to Conneaut Creek.

The cleanup levels to meet risk objectives for ground water are based on future use scenario. The ground water treatment will reduce risks posed from ingesting ground water to a cumulative Hazard Index of 1.0 or less and a cumulative cancer risk of 10^{-6} or less.

Interceptor trenches, extraction wells and GAC treatment are easily implemented.

2. Containment Components

This alternative would contain the buried drums, bulk wastes and contaminated soils by placing a multilayer cap over the source area. The cap would reduce infiltration and contaminant migration to the ground water. The cap would cover approximately a 3-acre area (120,000 square feet) and would be a soil-synthetic membrane cap.

This alternative would contain the source area by surrounding the buried drums, bulk wastes and contaminated soils with a slurry wall to prevent horizontal migration of contamination. The slurry wall would be installed three feet into the hard grey clay unit underlying the water table aquifer and the source area. The slurry wall would be approximately 25 feet deep, 3 feet thick and 1,100 feet long.

The wastes in the source area consist of buried drums (approximately 2,500 to 5,000 drums) bulk wastes and contaminated soils (approximately 25,000 to 30,000 cubic yards) contained in an area approximately 1.2 acres on the surface and 20 feet deep. Risks posed by materials in the landfill were not calculated because a representative sample was not able to be obtained. Limited sampling identified that contamination in the landfill was the same as that identified in other media except at greater concentrations (See Table 1).

3. Institutional Controls

A fence will be installed around the perimeter of the capped area to limit access to the site.

Deed restrictions would be placed on the land which would be capped to prevent future excavation or construction activities. Deed restrictions would be placed on property overlying the contaminant plume and source area to prohibit installation or use of drinking water wells in the three aquifers identified at the site.

Long-term operation and maintenance would exist to maintain the cap. Annual cap inspections and vegetation mowing will reduce the likelihood of cap failure. Long term cap maintenance would be required to correct settlement, erosion and other problems. The cap may need to be replaced after 30 years to prevent infiltration and contaminant migration.

Residual risk would remain from the drums, bulk wastes and contaminated soils in the source area since they will not be removed or treated. Long term ground water monitoring in the water table aquifer will be necessary to identify if the slurry wall fails. The expected life of a slurry wall is 30 years.

4. Estimated Time for Implementation

The slurry wall and cap construction should take 1 to 1.5 years, which includes testing, design, bidding, and construction. The ground water collection and treatment system will take 6 to 12 months, which includes testing, design, bidding, and construction. The total estimated time for completion is 1.5 to 2.5 years. A ground water collection time of 20 to 60 years would be required to reach risk objectives for ground water in all three aquifers. This estimate is based upon the amount of time necessary to remove contaminants from the saturated portion of the aquifer immediately below the source area and all contamination which has already migrated from the source area.

5. Costs

Estimated capital costs:	$5,000,000
Estimated present worth:	$8,000,000
Estimated annual O&M costs:	$ 360,000

6. ARARs

Ground water treatment must comply with chemical specific ARARs for barium (MCL = 1,000 ug/L), chromium (MCL = 50 ug/L), 1,4-dichlorobenzene (MCL = 75 ug/L), trichloroethene (MCL = 5 ug/L), and vinyl chloride (MCL = 2 ug/L).

Action specific ARARs are listed on Table 4.

C. Alternative 7 - On-Site Incineration, Vitrification, Ground Water Treatment

1. Treatment Components

This alternative would remove buried drums from the source area (approximately 2,500 to 5,000 drums) and incinerate the drums on-site. Contaminated soils will remain in the source area. Ash remaining after incineration, approximately 500 cubic yards, will be placed back in the source area. The ash and soils will be stabilized by in-situ vitrification. A soil contamination study will be conducted prior to vitrification to identify the extent of contamination. An estimated 25,000 to 30,000 cubic yards of soil and ash will need to be vitrified. After vitrification, the area would be backfilled to original grade with clean native soil.

Ground water in the water table aquifer would be collected with two interceptor trenches. Ground water in the alluvial, semi-confined bedrock and confined bedrock aquifers will be collected with extraction wells. The collected ground water will be treated on-site in a granular activated carbon system. If necessary, additional pretreatment of ground water will be implemented, see alternative 6. The estimated volume of contaminated ground water is 40 to 70 million gallons.

After treatment the effluent will be discharged to Conneaut Creek

The cleanup levels to meet risk objectives for the ground water are based on a future use scenario. The ground water treatment will reduce risks posed from ingesting ground water to a cumulative Hazard Index of 1.0 or less and a cumulative cancer risk of 10^{-6} or less.

Vitrification technology is still developmental and very few contractors are available to implement the technology.

Incineration, interceptor trenches, extraction wells and GAC treatment are easily implemented.

2. Containment Components.

This alternative does not include any containment components.

3. Institutional Controls.

The site will be fenced to limit access and to contain the source area (excavation area), drum staging area, on-site incinerator, and the ground water treatment system.

Deed restrictions will be placed on property overlying the source area and contaminant plume to prohibit installation or use of drinking water wells in the three aquifers identified at the site.

After incineration of drums and vitrification of soils, no long term monitoring or O&M would be required at the source area.

Once ground water risk objectives are met long term monitoring will not be necessary because the source area is stabilized.

4. Estimated Time for Implementation.

Drum removal, incineration and vitrification are expected to take 2 to 2.5 years which includes design, bid, mobilization, test burn, vitrification, demobilization, and backfill activities.

The preparation activities for ground water collection, treatment, and discharge would take 1.5 to 2.5 years for testing, design, bidding, and construction activities and would be concurrent with the source area remediation. 20 to 60 years is the estimated time to collect and treat all ground water to meet risk objectives (see alternative 6).

5. Costs

Estimated capital costs	$36,000,000
Estimated present worth:	$39,000,000
Estimated annual O&M costs:	$ 350,000

6. ARARs

Chemical specific ARARs are the same as those for alternative 6.

Action specific ARARs are listed in Table 4.

D. Alternative 8 - Off-Site Incineration, Ground Water Treatment

1. Treatment Components

This alternative would remove buried drums (approximately 2,500 to 5,000 drums), bulk wastes and contaminated soils (approximately 25,000 to 30,000 cubic yards) from the source area. The removed materials will be transported off-site to a RCRA permitted commercial incinerator. Drums, bulk wastes and contaminated soils will be removed until the bottom of the landfill or the water table is encountered. However, if drums or bulk wastes are located within the saturated zone, they will be removed. The water table is located approximately 17 feet below ground surface and the depth of the landfill is approximately 20 feet. After drums, bulk wastes and contaminated soils are removed, the excavated area will be sampled around the edges from the ground surface to 8 feet below the surface. The sampling will determine if soils, which may pose an exposure risk from ingestion or direct contact, have been removed. If necessary, more soils will be removed until the exposure risk is eliminated.

The excavated area will be backfilled with materials similar to native soils and graded and seeded.

Ground water in the water table aquifer will be collected with two interceptor trenches. Ground water in the alluvial, semi-confined bedrock and confined bedrock aquifers will be collected with extraction wells. The collected ground water will be treated on-site in a granular activated carbon system. If necessary, additional pretreatment of ground water will be implemented, see alternative 6. The estimated volume of contaminated ground water is 40 to 70 million gallons.

After treatment the effluent will be discharged to Conneaut Creek.

The cleanup levels to meet risk objectives for the ground water are the same as in alternative 7.

Excavation, backfilling, interceptor trenches, extraction wells and GAC treatment are easily implemented.

2. Containment components

This alternative does not include any containment components.

3. Institutional Controls

Access to the site will be controlled by installing a fence. The fence will surround the source area, the drum staging area to prepare materials for shipment, and the ground water treatment system.

Deed restrictions will be placed on property overlying the source area and contaminant plume to prohibit installation or use of drinking water wells in the three aquifers identified at the site.

After removal and transport of buried drums, bulk wastes and contaminated soils, no long term monitoring of the landfill will be necessary.

Once ground water risk objectives are met, long term monitoring will not be necessary because the source of contamination has been removed.

4. Estimated time for Implementation

Excavation and transport are expected to take 2.5 to 3 years, which includes design, bid, removing drums, bulk wastes and contaminated soils, transport to an incinerator and backfilling the excavated area.

Preparation activities for ground water collection, treatment and discharge would take 1.5 to 2.5 years for testing, design, bidding and construction activities. These activities would be concurrent with source area remediation. 20 to 60 years would be required to collect and treat all ground water to risk objectives (see alternative 6).

5. Costs

Estimated capital costs:	$63,000,000
Estimated present worth:	$67,000,000
Estimated annual O&M costs:	$ 420,000

6. ARARs

Chemical specific ARARs are the same as those for alternative 6.

Action specific ARARs are listed on Table 4.

E. Alternative 9 - On-Site Incineration, Ground Water Treatment

1. Treatment Components

This alternative will remove all buried drums (approximately 2,500 to 5,000 drums), bulk wastes and contaminated soils (approximately 25,000 to 30,000 cubic yards) from the source area. The removed materials will be incinerated on-site. All drums, bulk wastes and visibly contaminated soils will be removed until the bottom of the landfill or the water table is encountered. However, if drums or bulk wastes are located within the saturated zone, they will be removed. The water table is located approximately 17 feet below ground surface and the depth of the landfill is approximately 20 feet. After drums, bulk wastes and visibly contaminated soils are removed, the excavated area will be sampled around the edges from the ground surface to 8 feet below the surface. The sampling will determine if soils, which may pose an exposure risk from ingestion or direct contact, have been removed. If necessary, more soils will be removed until the exposure risk is eliminated.

The materials remaining after incineration will be placed back into the excavated area. It will be confirmed during test burns, prior to start up of the incinerator, that the ash is able to be delisted. The area will be backfilled with materials similar to native soils to bring it back to original grade.

Ground water in the water table aquifer will be collected with two interceptor trenches. Ground water in the alluvial, semi-confined bedrock and confined bedrock aquifers will be collected with extraction wells. The collected ground water will be treated on-site in a granular activated carbon system. If necessary, additional pretreatment of ground water will be implemented, see alternative 6. The estimated volume of contaminated ground water is 40 to 70 million gallons.

After treatment, the effluent will be discharged to Conneaut Creek.

The cleanup levels to meet risk objectives for the ground water are the same as those for alternative 7.

Excavation, backfilling, interceptor trenches, extraction wells and GAC treatment are easily implemented.

The implementability of the on-site incinerator is affected by the ability to meet state and local regulations applicable to this technology. Excavated material sampling, test burns and ash analyses will be required prior to initiating the incineration activities. The incineration system must meet performance requirements and air emission discharge requirements. The implementability of the alternative also depends on the incinerator ash being able to be delisted.

2. Containment Components.

This alternative does not include containment components.

3. Institutional Controls.

Access to the site will be controlled by a fence which will surround the source area, drum staging area, on-site incinerator and the ground water treatment system.

Deed restrictions will be placed on property overlying the source area and contaminant plume to prohibit installation or use of drinking water wells in the three aquifers identified at the site.

No long term monitoring of materials in the excavated area will be necessary.

Once ground water risk objectives are met, long term monitoring will not be necessary.

4. Estimated time for Implementation

Source area remediation, including design, bidding, mobilization, test burning, incineration set up, treatment, demobilization and backfilling activities are estimated to take 2 to 2.5 years.

Preparation activities for ground water collection, treatment, and discharge will take 1.5 to 2.5 years for testing, design, bedding, and construction activities. These activities will be concurrent with source area remediation. 20 to 60 years will be required to collect and treat all ground water to meet risk objectives (see alternative 6).

5. Costs

Estimated Capital Costs:	$36,000,000
Estimated Present Worth:	$39,000,000
Estimated Annual O&M Cost:	$ 320,000

6. ARARs

Chemical specific ARARs are the same as those identified for Alternative 6.

Action specific ARARs are listed on Table 4.

IX. Summary of the Comparative Analysis of Alternatives

A. Overall Protection of Human Health and the Environment.

Alternatives 8 and 9 are the most protective of human health and the environment. The source area drums, bulk wastes and contaminated soils are incinerated and the ground water is collected and treated until ground water risk objectives are met.

Alternative 7 protects the human health and the environment in the same manner as Alternatives 8 and 9, except that long term protection of vitrification is not certain.

Alternative 6 protects human health and the environment by containing the source area and treating the ground water however, the risk of contamination breaching the containment system will remain.

Alternative 1 is not protective of human health and the environment.

B. Compliance With ARARs

Alternatives 6, 7, 8 and 9 comply with ARARs.

Alternative 1 does not comply with ARARs.

C. Long-Term Effectiveness and Permanence.

Long-term risks are eliminated for alternatives 8 and 9 because the source of contamination (the source area) is removed and incinerated and ground water will be collected and treated until it meets risk objectives.

Alterative 7 provides long term effectiveness and permanence by incinerating the drums and vitrifying the ash and contaminated soils in the excavated area, however the long-term effectiveness of vitrification is not known. This alternative also collects and treats ground water as in alternative 8 and 9.

Alternative 6 reduces risks by containing the source area and collecting and treating ground water. However the source of contamination (the landfill) remains, presenting a possible future risk that contamination will breach the containment system.

Alternative 1 does not provide long term effectiveness because the risks are not removed.

D. Reduction of Toxicity, Mobility and Volume

Alternatives 7, 8 and 9 reduce toxicity, mobility, and volume of the source area and ground water contamination.

Alternative 6 reduces mobility of the source area by containing it and reduces toxicity, mobility and volume of ground water contamination by collecting and treating ground water.

Alternative 1 does not reduce toxicity, mobility or volume of contamination.

E. Short-Term Effectiveness

Alternatives 7 and 9 present a high risk to human health and the environment during incineration but this can be reduced by the application of engineering controls. Implementation of both alternatives will take approximately 2 to 2.5 years. These alternatives meet risk objectives.

Alternative 8 presents a moderate risk during incineration because incineration will be done off-site. Implementation will take 2.5 to 3 years. This alternative meets risk objectives.

Alternative 6 presents minimal risks to the human health and the environment. Implementation will take 1.5 to 2.5 years. This alternative meets risk objectives however the source area will remain, presenting a future risk.

Alternative 1 does not present any risks to the public because no remediation will occur. Risk objectives will not be met.

F. Implementability

Alternatives 6 and 9 are easily implemented and the technologies are proven.

Alternative 8 may present an implementation problem because only one RCRA-permitted incinerator is currently located near the site.

Few contractors are available to implement vitrification for alternative 7.

Alternative 1 does not involve any technologies which will be implemented.

G. Cost

	Estimated Capital Costs	Estimated Present Worth Costs	Estimated Annual O&M Costs
Alt. 1	$ 0	$ 0	$ 0
Alt. 6	$ 5,000,000	$ 8,000,000	$ 360,000
Alt. 7	$36,000,000	$39,000,000	$ 350,000
Alt. 8	$63,000,000	$67,000,000	$ 420,000
Alt. 9	$36,000,000	$39,000,000	$ 320,000

H. State

The Ohio EPA concurs with the U.S. EPA's chosen alternative to remediate contamination at the site.

I. Community Acceptance

A public meeting was held in Kingsville, Ohio on August 8, 1989. During the meeting the community expressed general acceptance of the proposed remedial alternative. Specific concerns included additional monitoring of residential wells, community safety during excavation and incineration and the exact location of ground water collection trenches north of the site.

Response to comments submitted by the public during the public comment period are presented in the Responsiveness Summary Section.

X. The Selected Remedy

The selected remedy to address contamination at the site is alternative 9 which involves excavation of buried drums, bulk wastes and contaminated soils in the source area (see Figure 3). All drums, bulk wastes and visibly contaminated soils will be removed until the bottom of the landfill or the water table is encountered. However, if drums or bulk wastes are located within the saturated zone, they will be removed. The water table is located approximately 17 feet below ground surface and the depth of the landfill is approximately 20 feet. After all drums, bulk wastes and visibly contaminated soils are removed, the excavated area will be sampled around the edges from the ground surface to 8 feet below the surface. The sampling will determine if soils, which may pose an exposure risk from ingestion or direct contact, have been removed. If necessary, more soils will be removed until the exposure risk is eliminated.

The non-combustible material and ash remaining after incineration will be used as backfill material in the excavated area as long as the ash is able to be delisted. Backfill similar to existing strata will be put in the excavated area. The top two feet of backfill will be soil which will be graded and seeded so to allow infiltration of precipitation and aid movement of any remaining contaminants out of the native soils to the ground water collection/treatment system.

The ground water collection system will collect ground water in the water table aquifer with two interceptor trenches; one at the downgradient edge of the plume and one at the north end of the source area, see Figure 4. The exact placement of the trenches will be decided after completion of a pre-design ground water study. This study will involve confirming what was presented in the RI, south of the site, and installing and sampling additional monitoring wells which will better define the geology north of the site and will determine how far contamination has migrated from the site.

The study will initially concentrate on the area north of the site where the plume may have migrated. This area will be determined based on ground water modelling and results from the last round of ground water sampling during the RI. If ground water contamination has not migrated to this theoretical point, additional wells will be installed closer to the source area until the boundary of the plume is identified. Conversely, if contamination has migrated beyond the theoretical limit, additional wells farther from the source area will be installed in order to place bounds on the location of the plume. The full extent of migration will be established prior to designing the ground water collection and treatment system.

Ground water in the alluvial and semi-confined bedrock and confined bedrock aquifers will be collected with 30 extraction wells. During the pre-design ground water study, the bedrock units will be sampled and the hydrogeology of those units will be confirmed. The collected ground water will be treated with granular activated carbon on-site and discharged to Conneaut Creek. If it is determined, during a pilot field test or a bench scale test that additional pretreatment, such as sand filtration, ozonation or air stripping, is necessary to achieve removal efficiencies of certain compounds, the system will be adjusted accordingly.

Ground water monitoring wells will be installed north of each interceptor trench to monitor for any contamination bypassing the trenches. The existing shallow and deep wells on the lower portion of the site will monitor for any contaminant migration bypassing the extraction wells. A collection time of 20 to 60 years will be required to reach ground water cleanup levels in the water table aquifer. This estimate is based upon the amount of time necessary to remove contaminants from the saturated portion of the aquifer immediately below the source area and all contamination which has already migrated from the source area. If contaminant concentrations change over time, the sampling program may be modified. Cleanup levels for the alluvial/bedrock aquifer should be met within 3 years.

Surface water monitoring will be implemented at 3 locations in Conneaut Creek (one upstream, one downstream, and one adjacent to the site).

The site risk objectives, which alternative 9 will meet, will reduce risks posed by contamination in the ground water to a cumulative Hazard Index of 1.0 or less and a cumulative carcinogenic risk of 10^{-6} or less.

XI. Statutory Determinations

A. Protection of Human Health and the Environment

The selected remedy will eliminate risks posed by contamination in the source area. These risks will be eliminated by incinerating the contents of the landfill. Risks posed by ingestion of ground water at the site will be eliminated by a ground water collection and treatment system.

Short-term risks to the community could be introduced by inhalation of air emissions from excavation or on-site incineration, or by direct contact with excavated material or contaminated surface water run off. Air emissions will be monitored and would be reduced by air pollution control systems when necessary. Risks from direct contact would be reduced by controlling site access. Surface water runoff controls would reduce the potential for contaminant migration from staged materials.

Workers would be in Level B protection during excavation activities. Protection against dermal contact and inhalation would be provided during staging, sampling, and loading activities as required. Air monitoring would assist in determining which activities require worker protection and the level of protection required.

B. Attainment of ARARs

The selected remedy is expected to attain all ARARs. The one problem which may arise is if the incinerator ash is not able to be delisted and backfilled in the excavated area. If the ash is not delistable, it will have to be handled as a hazardous waste. The selected remedy assumes that the characterization of the ash will allow the State of Ohio to waive their solid waste regulation regarding the final deposition of the ash. The State of Ohio has agreed to consider such a waiver when analysis of the ash is available.

The following chemical specific ARARs will be met by the selected remedy:

Barium	MCL =	1,000 ug/L
Chromium	MCL =	50 ug/L
1,4-Dichlorobenzene	MCL =	75 ug/L
Trichloroethene	MCL =	5 ug/L
Vinyl Chloride	MCL =	2 ug/L

The remedial action risk objectives for the site are based on reducing health risks posed by contamination in the ground water to a cumulative Hazard Index of 1.0 or less and a cumulative carcinogenic risk of 10^{-6} or less.

Table 5 presents the individual concentrations of indicator chemicals which will be used in computing the cumulative risks for ground water and the upper 8 feet of the source area soil.

The Agency has not identified location specific ARARs.

Action specific ARARs which apply to the selected remedy are listed on Table 4.

C. Cost Effectiveness

The selected remedy is cost effective. It is protective of human health and the environment, attains ARARs and provides long-term protectiveness. The long-term protectiveness is achieved by excavation and incineration of the source area and treatment of contaminated ground water. The selected remedy is less costly than alternative 8 while providing equal protectiveness. Alternative 1 is less expensive than the selected remedy however alternative 1 does not provide overall protection of human health and the environment and does not attain ARARs. Alternative 6 is less expensive than the selected remedy however this alternative does not provide long-term protectiveness of human health and the environment. In alternative 6 the source of contamination is not removed but contained, which presents a possible future risk of a breach of the containment structure. Alternative 7 is the same cost as the selected remedy however the selected remedy is easier to implement.

D. Utilization of Permanent Solutions, and Alternative Treatment Technologies of Resource Recovery Technologies to the Maximum Extent Practicable.

The selected remedy was determined to be the most appropriate solution to remediate the contamination at the site. The selected remedy is protective of human health and the environment and eliminates long-term risks by removing and incinerating the source area contamination. Alterative 8 is also equally protective and eliminates risks but the selected remedy is more cost effective. The selected remedy poses risks to the public and workers during implementation of the source area excavation and incineration (2 to 2.5 years duration) however, once this is completed the risks from the source area are eliminated, the toxicity, mobility and volume of the source area are eliminated and the protection of human health and the environment are maximum because the future risks of contamination from the source area is eliminated (compare to Alternative 6).

Ground water collection and treatment will eliminate risks posed to the public within 20 to 60 years, eliminate toxicity, mobility and volume of contamination in the ground water and will maximize protection of the human health and the environment. If the source area is not removed (see alternative 6), ground water cleanup will take an infinite amount of time if a breach of the containment structure occurs. The estimated time to collect and treat ground water, 20 to 60 years, is based upon the amount of time necessary to remove contaminants from the saturated portion of the aquifer immediately below the source area and all contamination which has already migrated from the source area.

Once ground risk objectives are met, long term monitoring will not be necessary.

Source area and ground water remediation are easily implemented and proven technologies (compare to alternative 7).

The selected remedy complies with ARARs.

E. Preference for Treatment as a Principal Element

The selected remedy uses treatment as a principal element to remediate risks posed by ground water contamination and source area contamination.

Treatment of the source area will involve excavating buried drums, bulk wastes and contaminated soils followed by incineration of these materials on-site.

Treatment of the ground water contamination will involve collecting ground water from the three aquifers identified on-site and treating ground water with granular activated carbon.

Table 1
Maximum Concentration Detected

Inorganics	Source Area (mg/kg)	Soils (mg/kg)	Ground Water (ug/L)	Surface Water (ug/L)
barium	154	204	3,813	76
beryllium	-	1.5	3	1.5
chromium	21.7	28	132	18
lead	136	25	146	21
nickel	34	45	134	28

Organics	Source Area (ug/kg)	Soils (ug/kg)	Ground Water (ug/L)	Surface Water (ug/L)
chlorobenzene	12,000,000	59,000	75,000	22
1,2-dichlorobenzene	7,500	9,300	210	-
1,4-dichlorobenzene	16,000	4,300	430	-
trans-1,2-dichloroethene	-	21	14,000	-
diaminotoluene	-	-	70	-
trichloroethene	3,300	46	7,500	-
tetrachloroethene	63,000,000	3,624	2,300	-
vinyl chloride	180,000	41	12	-

TABLE 2

EXPOSURE PATHWAYS AND EXPOSED POPULATIONS (UNDER TWO SITE USE SCENARIOS) EVALUATED IN THE ENDANGERMENT ASSESSMENT FOR THE BIG D SITE

(Page 1 of 2)

Exposure Pathway	Exposed Population	Comments
	Present Use	
Direct Contact with Surface Water	Children and adults 1 to 70 years of age involved in recreational activities such as hunting, fishing, swimming, or boating along or in Conneaut Creek adjacent to or downgradient of the Big D site.	The human population most likely to be exposed are guests at Big D and Locust Lane Campgrounds, as well as persons living along Creek Road, South Ridge Road, and Reed Road near the site.
Incidental Ingestion of Surface Water	Same as for direct contact with surface water above.	Same as for direct contact with surface water above.
Ingestion of Aquatic Life	Children and adults 1 to 70 years of age ingesting fish and other aquatic animals caught from portions of Conneaut Creek adjacent to or downgradient of the Big D site.	The human population most likely to be exposed are guests at Big D and Locust Lane Campgrounds, persons living along Creek Road, South Ridge Road, and Reed Road near the site, as well as residents of the City of Kingsville.
	Future Use -- Construction of Houses or Other Buildings On-site	
Ingestion of Soils	Children 2 to 6 years of age either living on-site or visiting the site.	The human population most likely to be exposed include: children vacationing at either Big D or Locust Lane Campgrounds; those children living along Creek Road, South Ridge Road, and Reed Road; as well as any children living in residences constructed on-site while other buildings are being constructed on-site. Exposure is expected to occur approximately 96 days/year under probable case conditions and 160 days/year under worst case conditions.

TABLE 2

EXPOSURE PATHWAYS AND EXPOSED POPULATIONS (UNDER TWO SITE USE SCENARIOS) EVALUATED IN THE ENDANGERMENT ASSESSMENT FOR THE BIG D SITE

(Page 2 of 2)

Exposure Pathway	Exposed Population	Comments
Future Use -- Construction of Houses or Other Buildings On-site		
Direct Contact with Soils	Same as for ingestion of soils above.	Sames as for ingestion of soils above.
Ingestion of Ground Water	Children and adults 1 to 70 years of age ingesting ground water from water supply wells near and downgradient of the site.	At the upper portion of the site, ground water exists in two hydraulically unconnected aquifers: the water table aquifer and the bedrock aquifer. The human population most likely to be exposed are those persons along Creek Road who use private wells screened in the water table aquifer. At the lower portion of the site, ground water exists in two hydraulically connected aquifers: the alluvial overbank aquifer; and the bedrock aquifer; with recharge from the water table aquifer. No drinking water wells completed in these aquifers were identified downgradient of the site.

Additional Pathways: These include the same pathways described above under Present Use with the following addition. The exposed populations for these pathways under future use conditions will include persons living in any residences constructed on-site.

Note:

See the text for more information concerning exposed populations and assumptions used in exposure calculations.

Table 3

Summary of Potential Risks Associated With the Big D Campground

Exposure Scenario	Total Cancer Risks[1]		Noncarcinogenic Hazard Index[2]	
	Probable Case	Worst Case	Worst Case Child	Worst Case Adult
Ingestion of Contaminated Soil				
Upper Portion of Site	-[3]	$1x10^{-10}$	<1	<1
Lower Portion of Site	-	$2x10^{-9}$	<1	<1
Direct Contact with Contaminated Soils				
Upper Portion of Site	-	$3x10^{-12}$	<1	<1
Lower Portion of Site	-	$5x10^{-11}$	<1	<1
Ingestion of Ground Water				
Upper Portion of Site				
Water Table Aquifer	$6x10^{-6}$	$1x10^{-2}$	290	82
Bedrock Aquifer	-	$4x10^{-5}$	5.4	1.6
Lower Portion of Site Alluvial Overbank and Bedrock Aquifer	-	$6x10^{-3}$	24	6.6

Notes:
[1] Total Cancer Risk = Average Lifetime Dose x Carcinogenic Potency Factor
[2] Noncarcinogenic Hazard Index = Exposure Dose ÷ Acceptable Chronic Intake
[3] Not Available or Not Calculated

Table 4
Action Specific ARAR's

Law, Regulation, or Standard	Source of Regulation	Description	Type of ARAR
FEDERAL			
Hazardous Waste Management System: General	CFR 260, et.seq.	RCRA regulates the generation, transport, storage, treatment, and disposal of hazardous wastes. CERCLA (Section 104 (c)(3)(B) specifically requires that hazardous substances generated from remedial actions be disposed of at facilities in compliance with Subtitle C of RCRA.	A
Resource Conservation and Recovery Act (RCRA) standards applicable to generators of hazardous waste	RCRA Subtitle C Section 3002, 40 CFR 262	Section 262 establishes standards for generators of hazardous wastes. This section requires that generators comply with the requirements for identification, accumulation, recordkeeping, and reporting.	A
RCRA standards for owners and operators of hazardous waste treatment, storage, and disposal facilities.	RCRA Subtitle C Section 3004, 40 CFR 264 and 265, and Federal Law 71:3101	These regulations establish minimum standards that define the acceptable management of hazardous wastes. These include the design and operation, monitoring, recordkeeping, closure, and post-closure requirements for hazardous waste management facilities.	A
Land Disposal Restrictions	RCRA Subtitle C Section 3004, 40 CFR 268	These regulations identify wastes that are from land disposal and establish treatment requirements necessary before these wastes can be land disposed.	A

A = Applicable
R&A = Relevant and Appropriate

Table 4 (cont.)

Law, Regulation, or Standard	Source of Regulation	Description	Type of ARAR
EPA-administered permit programs: The Hazardous Waste Permit Program	RCRA Subtitle C Section 3005, 40 CFR 270 and 124	These regulations cover the basic EPA permitting, monitoring, and reporting requirements for hazardous waste management facilities.	A
Standards of Performance for New Stationary Source	Clean Air Act, 40 CFR 60	These regulations establish the general provisions and performance standards for stationary sources of air emissions.	A
Safe Drinking Water Act	Safe Drinking Water Act, 40 CFR 141 through 143	This Act establishes maximum contaminant levels (MCL) and MCL goals (MCLG) at levels that would result in no known or potential adverse health affects. MCLs are enforceable health goals. In addition, this Act establishes guidelines for secondary drinking water standards.	A
Clean Water Act	Clean Water Act Section 301-308	This Act establishes non-enforceable guidelines for water quality that, when not exceeded, reasonably protect human health and aquatic life.	A
National Pollutant Discharge Elimination System (NPDES)	Clean Water Act Section 402, 40 CFR 122, 123, 125, and 136	This regulation sets forth requirements for point source discharge of water into public surface waters.	A
Occupational Safety and Health Act (OSHA)	29 CFR 1910	This Act establishes guidelines, requirements, and regulations to provide for the health and safety of workers conducting remedial action activities.	A

A = Applicable
R&A = Relevant and Appropriate

Table 4 (cont.)

Law, Regulation, or Standard	Source of Regulation	Description	Type of ARAR
STATE			
Ohio Solid and Hazardous Waste Disposal Law	Ohio Revised Code (ORC) 3734.02(H)	This regulation prohibits excavation and construction activities without authorization from the Ohio Director of Environmental Protection.	A
	Ohio Revised Code 3734.05(C)	This regulation defines criteria and requirements that need to be included in a hazardous waste facility operating permit.	A
Ohio Solid Waste Disposal Regulations	Ohio Administrative Code (OAC) 3745-27-02	This regulation states that no provision of 3745-27 or 3745-37 shall exempt parties from compliance with any federal regulation or any section of the Ohio Revised Code.	A
	OAC 3745-27-05	This regulation specifies that solid waste in Ohio must be managed by landfilling, incineration, compositing, or approved methods not prohibited by OAC 3745-27.	A
	OAC 3745-27-06	This regulation requires that the plans for new solid waste disposal facilities specify the design features for on-site solid waste disposal activities.	A
	OAC 3745-27-07	These regulations require that the operator incinerate waste materials as soon as possible and that incinerator operations comply with chapters 3704 and 6111.	A

A = Applicable
R&A = Relevant and Appropriate

Table 4 (cont.)

Law, Regulation, or Standard	Source of Regulation	Description	Type or ARAR
	OAC 3745-27-08	These regulations establish the general performance requirements for the operation of solid waste disposal facilities.	A
	OAC 3745-27-10	These regulations establish the general performance requirements for the closure of sanitary landfills.	R & A
Ohio Hazardous Waste Management Regulations	OAC 3745-50 through 3745-69	These regulations closely parallel the federal regulations described in 40 CFR 264 and establish minimum standards for the acceptable management of hazardous wastes.	A
Ohio Water Quality Standards	OAC 3745-01 (-03, -04, -05, and -07)	These regulations establish performance standards for the collection of samples and maintenance of existing surface water. They prohibit nuisance discharges and define water use and criteria that should be maintained.	A
Ohio Air Pollution Regulations	OAC 3745-15-07	This regulation prohibits air pollution nuisance emissions not regulated under 3745-17, 3745-18, 3745-21, or 3745-31. The substantive requirements of these regulations are applicable to alternatives that would produce air emissions.	A
	OAC 3745-15-16	This regulation establishes stack height guidelines for point sources of air emissions.	A
Ohio Particulate Matter Standards	OAC 3745-17 (-02,-05, -07, and --09)	These standards specify maximum ambient air particulate levels and establishes emission limits for opacity and capacity.	A

A = Applicable
R&A = Relevant and Appropriate

Table 4 (cont.)

Law, Regulation, or Standard	Source Regulation	Description	Type of ARAR
Ohio Sulfur Dioxide Standards	OAC 3745-18 (-02, -04, and -06)	These establish standards, methods of measurement, and allowable emission rates for sulfur dioxide.	A
Ohio Regulations for Carbon Monoxide, Photochemically Reactive Materials, Hydrocarbons, and related materials	OAC 3745-21 (-02, -03, and --05)	These regulations set ambient air quality standards, establish acceptable methods for the measurement of ambient air quality, and prohibit the degradation of ambient air quality set in 3745-21-02.	A
Ohio Regulations for Carbon Monoxide, Photochemically Reactive Materials, Hydrocarbons, and related materials	OAC 3745-21-07	These regulations establish rules to control the emission of organic materials from new stationary sources.	A

A = Applicable
R&A = Relevant and Appropriate

Table 5

CLEANUP LEVELS BASED ON INGESTION OF INDICATOR CHEMICALS IN GROUND WATER

	Ground Water Concentration (ug/L) Based on Hazard Index of 1.0[1]		Ground Water Concentrations (ug/L) Based on Upperbound Lifetime Cancer Risks of:
Chemical	Adult Exposure	Child Exposure	10^{-6} [2]
SHALLOW GROUND WATER AT UPPER PORTION OF THE SITE (WATER TABLE AQUIFER)			
Chlorobenzene	945	270	NA[3]
2,4-Diaminotoluene	NA	NA	1.1×10^{-2}
Tetrachloroethene	700	200	6.9×10^{-1}
Trichloroethene	NA	NA	3.2
Vinyl Chloride	NA	NA	1.5×10^{-2}
DEEP GROUND WATER AT UPPER PORTION OF THE SITE (CONFINED BEDROCK AQUIFER)			
Chromium (Cr^{+3}/Cr^{+6})	35,000/175	10,000/50	NA
Nickel	350	100	NA
Tetrachloroethene	NA	NA	6.9×10^{-1}
GROUND WATER AT LOWER PORTION OF THE SITE (ALLUVIAL OVERBANK AND SEMI-CONFINED BEDROCK AQUIFER)			
Barium	1995	570	NA
Chlorobenzene	945	270	NA
2,4-Diaminotoluene	NA	NA	1.1×10^{-2}
Tetrachloroethene	700	200	6.9×10^{-1}
Trichloroethene	NA	NA	3.2

[1] Based on Hazard Index = Exposure Dose/Acceptable Chronic Intake and assuming an ingestion rate of 1 L/day and a body weight of 10 kg for children and an ingestion rate of 2 L/day and a body weight of 70 kg for adults.

[2] Based on the following assumptions for adults: ingestion rate = 2 L/day; body weight = 70 kg; frequency of contact = 365 days; years of exposure = 70 years

[3] NA = Not applicable

Table 5 (cont.)

CLEANUP LEVELS BASED ON INGESTION AND DIRECT CONTACT WITH CONTAMINATED SOURCE AREA SOIL

	Soil Concentrations (mg/kg) Based on Hazard Index of 1.0		Soil Concentrations (mg/kg) Based on Upperbound Lifetime Cancer Risk of 10^{-6}	
Chemical	Ingestion[1]	Direct Contact[2]	Ingestion[3]	Direct Contact[4]
Chlorobenzene	1.2×10^3	4.1×10^4	NA[5]	NA
Tetrachloroethene	3.4×10^2	2.7×10^3	1.2×10^1	3.9×10^1
1,4-Dichlorobenzene	NA	NA	23	7.4×10^2
1,2-Dichlorobenzene	NA	NA	23	7.4×10^2

[1] Based on an ingestion rate of 1.0×10^{-3} kg/day for worst case and an average body weight for children of 17 kg.

[2] Based on an exposure amount of 3.75×10^{-4} kg/day, an average body weight for children of 25 kg, and a percent absorption of 5 percent for organic compounds.

[3] Based on an ingestion rate of 1.0×10^{-3} kg/ day for worst case, an average body weight for children of 17 kg, and exposure frequency of 160 days, and 5 years of exposure.

[4] Based on an exposure amount of 3.75×10^{-4} kg/day, an average body weight for children of 25 kg, a percent absorption of 5 percent for organic compounds, an exposure frequency of 144 days per year, and 12 years of exposure.

[5] NA = Not Applicable

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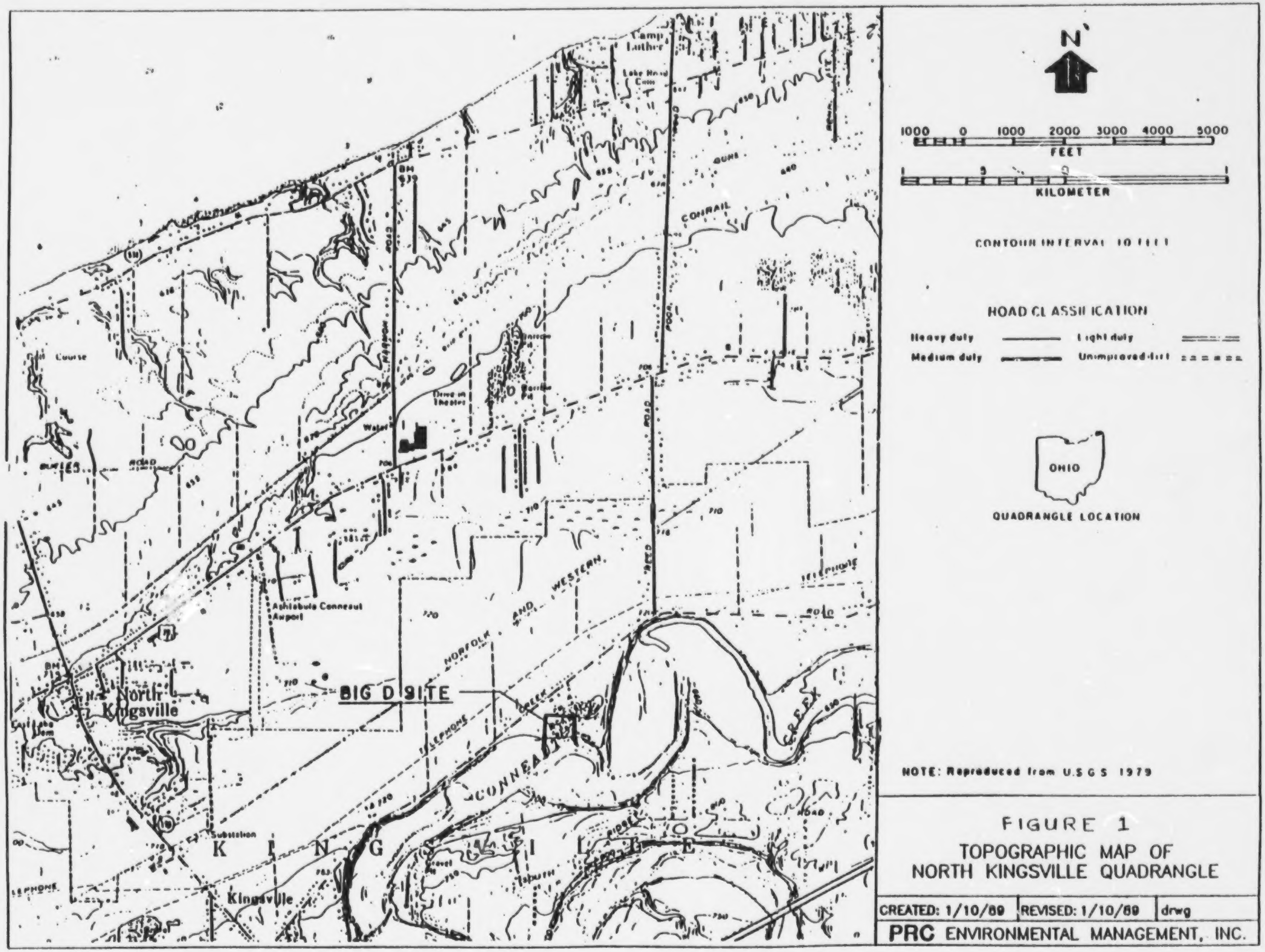
N
1000 0 1000 2000 3000 4000 5000
FEET
1 0 1
KILOMETER
CONTOUR INTERVAL 10 FEET
ROAD CLASSIFICATION
Heavy duty
Light duty
Medium duty
Unimproved dirt
OHIO
QUADRANGLE LOCATION
Camp Luther
CONRAIL
Drive-in Theater
Water
Golf Course
Ashtabula Conneaut Airport
NORFOLK AND WESTERN
TELEPHONE
BIG D SITE
North Kingsville
Kingsville
Substation
CONNEAUT
CREEK
K I N G S V I L L E
ROAD

NOTE: Reproduced from U.S.G.S 1979

FIGURE 1
TOPOGRAPHIC MAP OF
NORTH KINGSVILLE QUADRANGLE

CREATED: 1/10/89	REVISED: 1/10/89	drwg

PRC ENVIRONMENTAL MANAGEMENT, INC.

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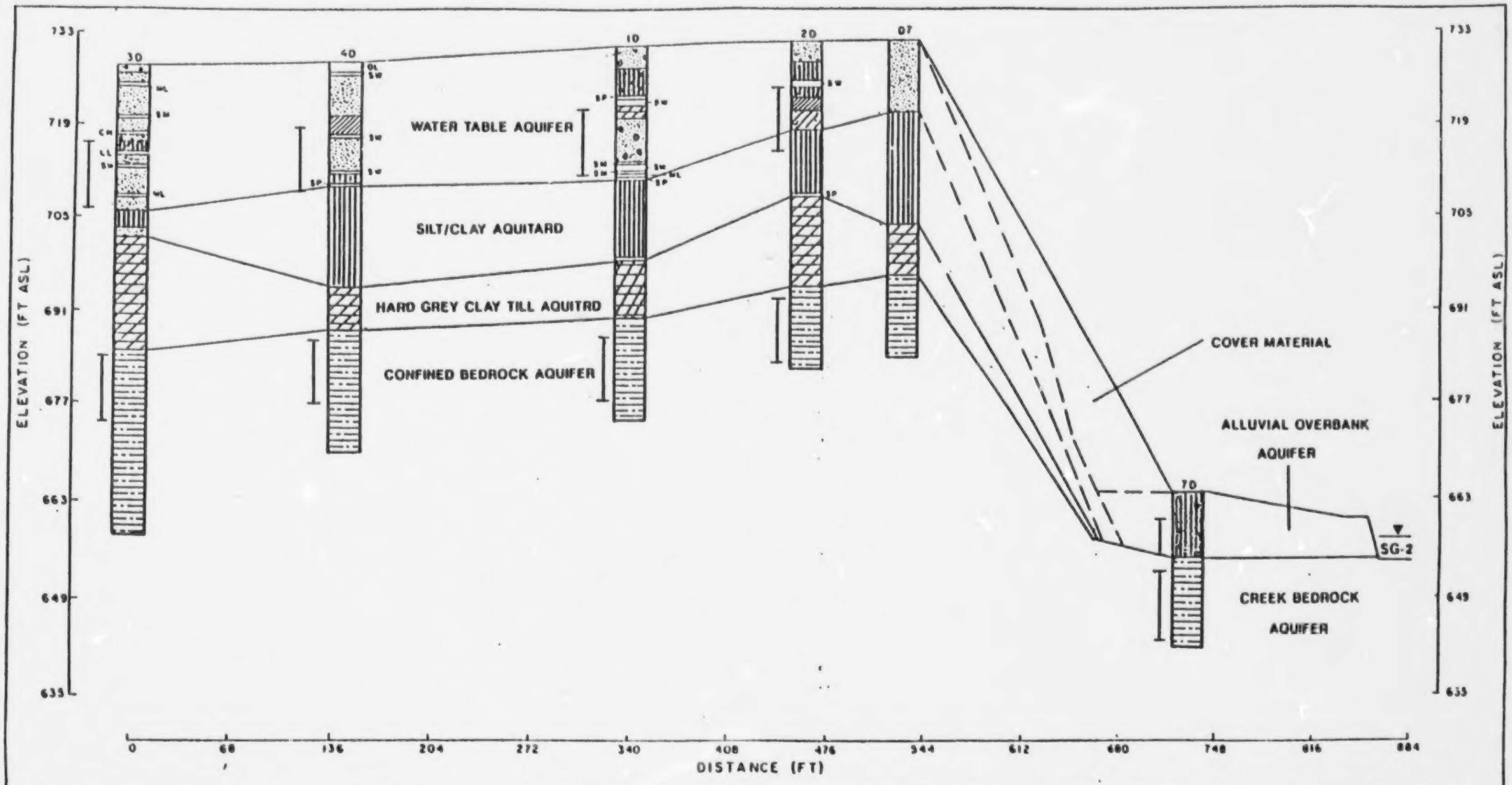
ELEVATION (FT ASL)
733
719
705
691
677
663
649
635
30
40
10
20
D7
70
WATER TABLE AQUIFER
SILT/CLAY AQUITARD
HARD GREY CLAY TILL AQUITRD
CONFINED BEDROCK AQUIFER
COVER MATERIAL
ALLUVIAL OVERBANK
AQUIFER
CREEK BEDROCK
AQUIFER
SG-2
0
68
136
204
272
340
408
476
544
612
680
748
816
884
DISTANCE (FT)

LEGEND ▼ Static water level (May 1987)

Note: D7 was completed by Olin prior to the RI.

I SCREENED INTERVAL	▨ SC	▨ SW	▥ OL	▨ ML/CL
	▨ SM	▥ ML	▨ CH	▤ CL/ML
	▨ SP	▨ CL	▥ MH	▤ BR

PROJECT: BIG D CAMPGROUND
FILE: W64532RI
LOCATION: KINGSVILLE

FIGURE 2

GEOLOGIC CROSS SECTION
30-SG2

PRC Environmental Management, Inc.

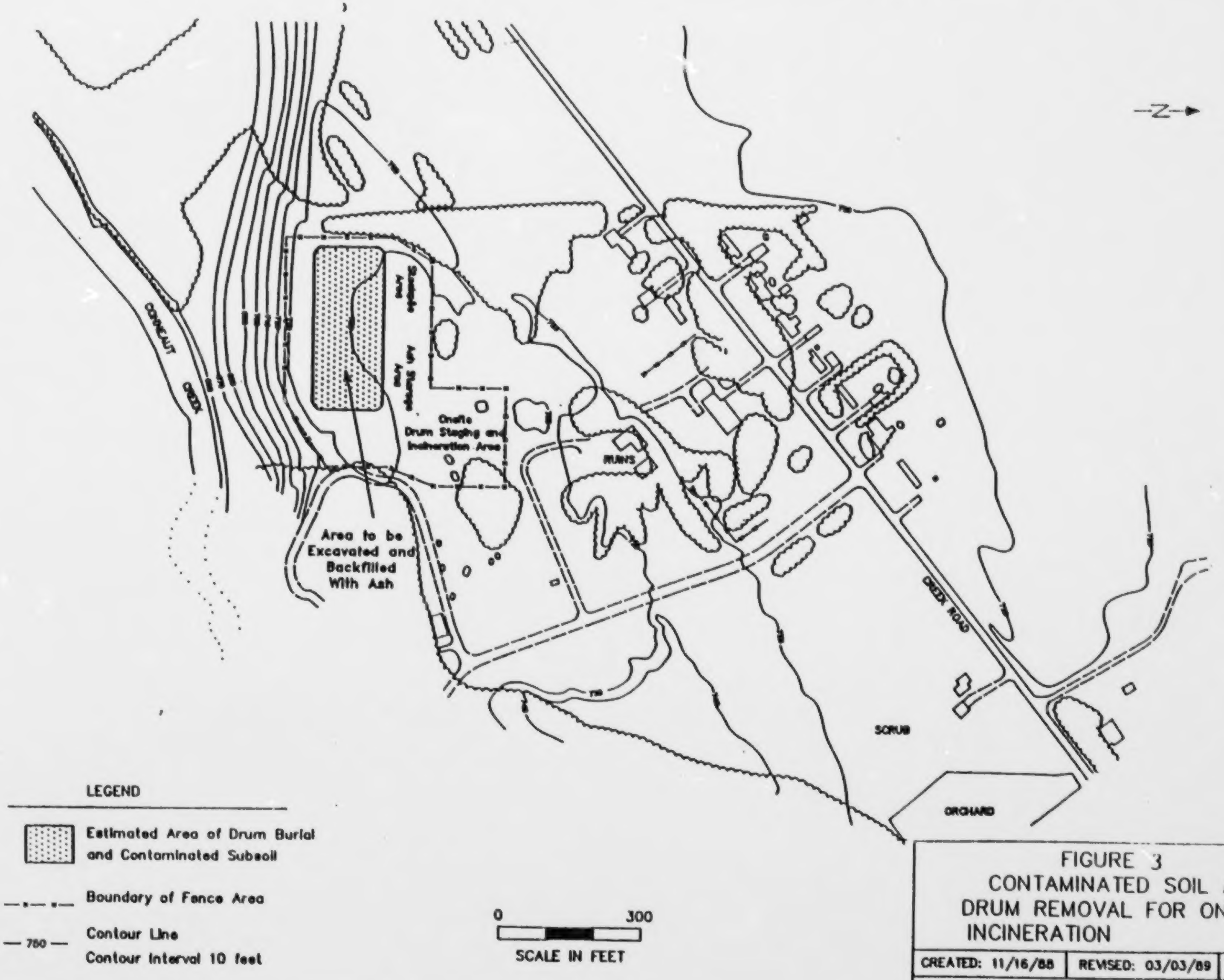
-N-
CONNEAUT CREEK
Stockpile Area
Ash Storage Area
Onsite Drum Staging and Incineration Area
Area to be Excavated and Backfilled With Ash
RUINS
CREEK ROAD
SCRUB
ORCHARD
LEGEND
Estimated Area of Drum Burial and Contaminated Subsoil
Boundary of Fence Area
750 Contour Line
Contour Interval 10 feet
0
300
SCALE IN FEET

FIGURE 3
CONTAMINATED SOIL AND
DRUM REMOVAL FOR ON-SITE
INCINERATION

CREATED: 11/16/88 REVISED: 03/03/89 ONSITE.DWG

PRC ENVIRONMENTAL MANAGEMENT, INC.

RESPONSIVENESS SUMMARY

BIG D CAMPGROUND SUPERFUND SITE
KINGSVILLE, OHIO

SEPTEMBER 1989

Produced by

PRC Environmental Management, Inc.
and
ICF Technology Incorporated

Work Assignment No. : 01-51B1
EPA Region : 5
Date Produced : September 29, 1989
ARCS Contract No. : 68-W8-0084
Site No. : OHD980611735
Site Manager : Ron Reising
Telephone No. : (312) 856-8700
EPA RPM : Janice Bartlett
Telephone No. : (312) 886-5438

RESPONSIVENESS SUMMARY:

BIG D CAMPGROUND SUPERFUND SITE
KINGSVILLE OHIO
SEPTEMBER 1989

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Appendix A: Submitted Community Comments

Appendix B: Submitted Olin Chemicals Corporation Comments

Appendix C: Transcript of public hearing held on Tuesday, the 8th day of August, 1989 at the Kingsville Fire Hall, Kingsville, Ohio

Appendix D: Submitted Ohio Environmental Protection Agency Comments

INTRODUCTION

This document is the Responsiveness Summary for the Big D Campground Superfund Site, located in Kingsville, Ohio. According to Superfund law, before the United States Environmental Protection Agency (U.S. EPA) can sign a Record of Decision, it is required to review and respond to comments received regarding any proposed remedial action to be taken at a site. Comments from the Kingsville community were submitted to U.S. EPA during a public comment period that was held from July 28 to August 26, 1989 and the public comments received are summarized on the following pages.

The Responsiveness Summary is split into three sections. Section 1 contains a summary of the comments received from community members and is followed by U.S. EPA's response. Section 2 contains a summary of comments received from the Olin Chemicals Corporation and also is followed by U.S. EPA's response. Finally, Section 3 presents comments from the Ohio Environmental Protection Agency and U.S. EPA's responses. In addition, the appendices include copies of all comments submitted as well as a transcript from the public hearing held on August 8, 1989 in Kingsville, Ohio.

Each summarized comment is followed by an alpha-numeric reference code indicating the source of the comments. The key to the reference code is as follows:

A) "Transcript of public hearing held on Tuesday, the 8th day of August, 1989, at the Kingsville Fire Hall, Kingsville, Ohio." Following the letter "A" is the page number, followed by the line number.

B) "Comments on the RI/FS Reports Big D Campground Superfund Site," Submitted by Olin Chemicals Corporation, August 25, 1989. Following the letter "B: is the page number.

C) Comments from Mr. and Mrs. Norma Thorpe, August 8, 1989.

D) Comments from Tim Baird, August 8, 1989.

E) Comments from Tracey Dreslinski, August 8, 1989.

F) Comments from the Ohio Environmental Protection Agency.

SECTION 1: SUMMARY OF COMMUNITY COMMENTS AND U.S. EPA RESPONSES

Adequacy of Sampling and Monitoring

Comment: We live directly south of the dump and want our soil and water tested. No one has ever tested it. [C]

U.S. EPA Response:

The soils and ground water which were found to be contaminated at the site are not connected to soils and ground water south of the landfill (south of the Creek). The erosion of the Creek has caused the separation. The Creek has eroded soils down to the deep bedrock which eliminates the pathway of soil contamination moving south of the Creek. Ground water flow also is interrupted by the Creek. The Hydrogeologic Investigation conducted during the RI shows that ground water flows toward and into the Creek, therefore cross-contamination of ground water cannot occur.

In addition, during the Remedial Investigation, two residential wells were sampled south of the Creek. The results of this sampling did not indicate that any contamination has migrated south of the Creek. No soil sampling was conducted off-site in residential areas.

U.S. EPA does not feel it is necessary to test any ground water or soils on property south of the Creek because a pathway for migration does not exist.

Comment: We support the Remedial Alternative #9 and hope that U.S. EPA can proceed to implement it as soon as possible. Until you do start the procedure, we would hope you would do more frequent water and soil testing. We suggest that you test all parties in the immediate area of the site, and make the test results available to them. [C]

Will drum samples or well samples be taken during the remedial action? [A,73,14]

U.S. EPA Response:

U.S. EPA sampled six residential wells in May, 1987 and the Ohio Environmental Protection Agency (Ohio EPA) conducted limited residential well sampling in September, 1988. These residential wells did not exhibit any ground-water contamination; however, U.S. EPA recognizes the need for further monitoring of residential drinking water wells.

U.S. EPA and Ohio EPA will arrange further sampling of residential drinking water wells north of the Creek, primarily on Creek Road. The results of this sampling event will be sent to the owners of the wells sampled. During the remedial action, ground water will be monitored to insure that the contaminant plume does not bypass the northern interceptor trench and the extraction wells by the Creek. Sampling of drums to be removed from the landfill will be conducted prior to incineration during the remedial action.

Comment: When was the last time Mr. Baird's well was sampled? Mr. Baird's well was not sampled by Ohio EPA six months ago. [D]

U.S. EPA Response:

Mr. Baird's well, located at 3740 Creek Road, was sampled by the U.S. EPA in May, 1987. During this sampling round, the owner's name was listed as "Ramison".

Comment: We are concerned about those residents who have wells that are inside the defined plume area. Apparently the State did some sampling less than six months ago, but not all of the wells were sampled. We need to be assured that all the wells in the area are safe for us to use. [A,23,14]

U.S. EPA Response:

The plume area was defined based on numerous pieces of information, such as known concentrations of contaminants found in wells around the landfill, the ground-water flow direction and the type of soils the water is moving through. However, sampling done at the selected homes indicates that contamination is not present. In addition, during sampling events at residential wells, it was observed that the water table was very shallow (approximately five feet deep) compared to the water table on-site which is located at approximately 15-20 feet below the surface. This difference in water levels indicates that the residential wells are probably screened in a perched aquifer which is separated from, and above, the water table aquifer identified on site.

In order to verify that contamination of ground water has not occurred, U.S. EPA and Ohio EPA will arrange to conduct further sampling of residential wells north of the site, primarily on Creek Road. The results of this sampling event will be sent to the owners of the wells.

An additional ground water study will also be conducted to determine exactly where ground water contamination is located; how far it has migrated from the site. This study will involve installing more monitoring wells and sampling these wells to determine the extent of contamination.

Comment: It seems that U.S. EPA did not collect enough soil samples to accurately characterize the effect of site contamination on the soil. [A,25,20]

U.S. EPA Response:

During the RI soil samples were collected from nine borings around the landfill. These samples were selected based on screening with an organic vapor detector. The general sampling locations were just above the water table, just below the water table, just above the hard grey till geologic unit, and at the base of the hard grey till unit. U.S. EPA feels these samples characterize the soil contamination on site.

Comment: U.S. EPA doesn't know what's in the landfill. [A,68,6]

At one point, Olin Chemicals Corporation was scared about thylene gas leaks. It killed people working for them. [A,66,20] U.S. EPA says that it has no written information on whether thylene is in the landfill. U.S. EPA should be able to get Olin Chemicals Corporation to say what is in the landfill. [A,67,10]

We don't know what's dumped in that landfill because U.S. EPA cannot get a hold of Olin Chemicals Corporation or cannot press them into telling us what is in that landfill, and I think you better get on the ball here and try to find out what's in there, how far that landfill is going to seep into everybody's property along Creek Road--across Conneaut Creek and do something about it, because we haven't done anything about it so far. [A,86,17]

U.S. EPA Response:

On December 2, 1985, U.S. EPA sent letters to several companies in Kingsville and Ashtabula, Ohio, including Olin Chemicals Corporation. These letters requested all information the companies may have had concerning the operations at the Big D Campground site. Responses to those letters identified wastes which were disposed of in the landfill. Olin Chemicals Corporation identified four RCRA listed hazardous wastes which were disposed of in the landfill: centrifuge and distillation residue from toluene diisocyanate (TDI) production; benzene, 1-3-diisocyanatomethyl; chlorobenzene; toluenediamine (TDA). In addition, Olin identified the following materials which may have been transported to the site for disposal: spent vacuum pump oils, TDI residue contaminated with monochlorobenzene (MCB) and carbon tetrachloride, earth contaminated with TDA and TDI spills, flyash, trash, monoethanolamine (MEA), off-spec TDI, and TDA and TDI in sample cans and bottles. The vacuum pump oil may have been contaminated with TDI, MCB and trace phosgene. Thylene was not identified as having been put in the landfill.

During the RI, two test pits were excavated in the landfill to verify the presence of buried drums and other wastes. This sampling confirmed that there are materials similar to what Olin described, i.e., buried drums and bulk wastes, in the landfill. During this excavation several samples of drum contents, contaminated soils and other wastes were taken to characterize the type of contamination in the landfill. This sampling identified that contamination from the materials in the source area was similar to that found in the ground water and soils and that the contamination is migrating away from the landfill.

Ground Water

Comment: If U.S. EPA just used a computer model to project the location of the groundwater plume, then you have no specific evidence from monitoring wells. [A,74, 23] When it comes time to install the trenches and the groundwater monitoring system, if the groundwater plume has been defined to be larger, then it is not necessary to install those trenches where you show them. They may very well be much closer to the actual site. [A,75,5] If it takes two trenches to do the job, they could both be located south of the homes. [A,75,14]

U.S. EPA Response:

The computer model which estimates the location of the ground-water plume uses the concentrations of contaminants detected in the monitoring wells to estimate the extent of the plume. See pages 4-18 of the RI report, which discusses that the level of contamination of chlorobenzene was used to determine the extent of the plume.

The location of the northern extraction trench will depend on the extent of the plume, which will be determined after further ground-water study. This trench will be installed at the downgradient (northern) edge of the plume. If it is determined that the northern edge of the plume is south of the homes on Creek Road, the northern trench will be located south of the homes.

Comment: The plume area is just an estimated area, and it seems that the plume could be moving in another direction. When will U.S. EPA know for sure the exact area of contamination so that a remedy can be designed? It appears that U.S. EPA could have collected more samples do accurately define the areas of contamination. [A,24,15]

U.S. EPA Response:

The direction of ground-water flow determines the direction of movement of the contaminant plume. Ground-water movement was determined based on water level measurements taken during the RI. See the RI report page 3-7 for details.

A further ground-water study will be conducted to determine a more precise extent of ground-water contamination. This study should be completed within the next year and one half and will provide information necessary to place and construct the ground-water cleanup system.

The ground-water samples which were collected during the RI identified that ground-water contamination does exist and that the source of contamination is the landfill, from which the contamination is migrating. The RI ground-water study was conducted to obtain this information. When the RI was in the planning stages, it was not known in what direction ground water was flowing, what type of contamination existed, or the geology of the site.

Comment: Isn't it true that Olin Chemical Corporation, at some point, placed a clay cap over the site and has a monitoring well and run-off trench that are still in place? [A,45,12] It must be true that whatever contamination has taken place through groundwater seepage took place prior to 1983 or 1984 when Olin Chemicals Corporation put the clay cap on the waste and installed the water collection trench. [A,46,2]

U.S. EPA Response:

In December, 1978, Olin Chemicals Corporation installed three wells near the Creek (see RI, Page 1-12). In December, 1983, Olin installed 11 additional monitoring wells. In March, 1983, Olin submitted evidence to U.S. EPA that it covered, regraded, and seeded the landfill. The wells and cover are still in place.

The earliest sampling done by the U.S. EPA was April, 1982, which identified ground-water contamination. While it is not known exactly when contaminant migration occurred, the potential for migration has existed since the first wastes were deposited and will continue for as long as wastes remain.

Comment: I would like more information about the ground-water treatment plant. How long will it be in place? [A,56,8] How long will it be in operation? [A,56,24]

We are the people who are living in those houses that will be between the trenches. People will be working and digging and going in and out of there for 20 years. It will change out whole quality of life. [A,57,7]

I am concerned about the location of the trenches. I'd like to know where they are going to be before I make a comment on the Proposed Plan. I'd hate to see the trenches go south through the row of homes where I live. [A,101,18]

I think that people should be immediately reimbursed for any damage to their property that U.S. EPA causes when the trenches are being built. [A,102,19]

I worry about the property values. Since this has come out in the Star Beacon anybody people perceive that property values around the site are worth squat. Nobody is going to by that property now. When U.S. EPA get done, will all the property owners get an affidavit saying that the property is safe and that property values have been restored?

I'm an independent real estate appraiser. I'm not directly affected as the property owners are, but I'm going to be indirectly affected because I'm going to end up appraising some of the properties in the area. The Federal Home Loan Bank made a statement pertaining to values. The Federal Home Loan Bank has issued a memorandum or a statement that now as an independent appraiser I have to notify on the appraisal report of any property that's within one mile of a Superfund site. I don't want to speak for the underwriters, but when they see a situation like this, to me that means a big red flag, and I guess there's going to be some type of value diminished. This is a big project for a small community to fathom. [A,116,6]

U.S. EPA Response:

The ground water collection system will collect ground water in the water table aquifer with two interceptor trenches; one at the downgradient edge of the plume and one at the north end of the source area. The exact placement of the trenches will be decided after completion of a pre-design ground-water study. This study will involve installing and sampling additional monitoring wells which will better define the geology north of the site and will determine how far contamination has migrated from the site.

The trenches will be in place for approximately 20-60 years. The trenches will be installed underground to a depth of approximately 25 feet, will be filled with a permeable material to collect ground water, and should not be noticeable after they are reseeded. Once the trenches are installed and operational, personnel will not be "working and digging and going in and out" of resident's property because the ground water collection process is done by the trenches. Personnel will only be required to work on the trenches for regular maintenance checks or if a problem arises with the ground-water collection system. Personnel will be working in the ground-water treatment plant which will be located on the site.

U.S. EPA and Ohio EPA will attempt to design the placement of the trenches to minimize the impact to residences in the vicinity of the trenches. The agencies will attempt to repair to its original condition any property that is damaged during installation of the trenches.

Ground water in the alluvial and semi-confined bedrock and confined bedrock aquifers will be collected with 30 extraction wells. The collected ground water will be treated with granular activated carbon on-site and discharged to Conneaut Creek.

Ground-water monitoring wells will be installed north of each interceptor trench to monitor for any contamination bypassing the trenches. The existing shallow and deep wells on the lower portion of the site will monitor for any contaminant migration bypassing the extraction wells.

A collection time of 20 to 60 years will be required to reach ground-water cleanup levels. This estimate is based upon the amount of time necessary to remove contaminants from the saturated portion of the aquifer immediately below the source area and all contamination which has already migrated from the source area. If contaminant concentrations change over time, the sampling program may be modified.

The site will be fully cleaned up once the landfill contamination is incinerated and the contaminated ground water clean up is completed. The agencies will then remove the site from the National Priorities List and will it will no longer be a Superfund site.

U.S. EPA cannot guarantee that property values will not be affected. The primary purpose of U.S. EPA is to protect public health and the environment. The Agency believes that the selected remedy will best address environmental impacts and future health risks posed by site conditions. U.S. EPA will attempt to minimize other impacts posed by the remedy.

Comment: Suppose U.S. EPA finds contamination in water wells, then what happens? How will we be provided with water if the water wells are found to be contaminated? [A, 70,17]

What we were told before was that if they found any wells that are contaminated, U.S. EPA would hook everyone into either Conneaut or Ashtabula, and Olin Chemicals Corporation would have to pay for it. Does that still stand? [A,71,7]

U.S. EPA Response:

If contamination migrates from the site and is discovered in residential drinking water wells, U.S. EPA, in conjunction with Ohio EPA, will provide an alternate drinking-water source. One way to provide an alternate drinking-water source would be to hook-up residents to a nearby municipal water source. The U.S. EPA would try to get the PRPs to pay for the hook-up. If necessary the U.S. EPA would pay the costs and attempt to regain costs at a later date from Potentially Responsible Parties (PRPs).

Distribution of Information

Comment: Information from U.S. EPA should be sent to all Kingsville residents concerning the Big D Campground site, especially if there should ever be an evacuation. [C] If U.S. EPA continues to take samples, conduct tests, and monitor the residents that live nearby should be notified. (A,40,2)

U.S. EPA Response:

The U.S. EPA mailing list for the site was established based on interest shown by residents who attended public meetings held in 1987 and 1989. Whenever new information is released to the public or a public meeting is scheduled, a notice is published in a local paper to advise all residents. The U.S. EPA will advise residents living near the site of work scheduled to be conducted on-site.

Any evacuation plan, which would be prepared by U.S. EPA would contain the names, addresses, and phone numbers of all residents in the immediate vicinity of the site.

Incineration

Comment: I am concerned about the proposed incinerator. The specifics of the incinerator must be explained to the community. For example, will the incinerator have a scrubber as part of the system? [A,23,7] What type of incinerator will it be? [A,31,18] Is there going to be a lot of noise during operation of the incinerators? [A,82,13]

U.S. EPA Response:

The U.S. EPA will mail a fact sheet on incineration to all persons on the mailing list. As soon as the specific incinerator to be used is chosen, further information will be sent to the residents on the mailing list and, if interest warrants, a meeting will be scheduled to provide additional information.

Excavation

Comment: The wind primarily comes out of the northwest and I live downwind from the site. As you plan to dig up material at the site that will be incinerated, precautions must be taken. Is there any danger to the people who live downwind of the site while U.S. EPA is digging up and transporting contaminated material? [A,22,9]

U.S. EPA Response:

Air monitoring will be conducted during excavation to ensure on-site worker protection and to monitor the air quality near the site for residents.

Comment: You are proposing excavation, but at a prior public meeting we were told that if the wastes were just dug up, there could be more problems, like another Love Canal. Now, if you go in there and start digging won't you have the same concerns? [A,58,9)

U.S. EPA Response:

The RI report identifies types of contaminants at the site. Information on the types of wastes placed in the landfill also has been obtained from Olin Chemicals Corporation. There is no indication nor any reason to believe that this site will turn into another Love Canal. However, safety precautions and contingency plans to handle any emergency situations will be established prior to beginning any excavation work at the site.

Comment: During the excavation activities, it seems that there should be an independent party that monitors the contractors. [A,88,16]

How many U.S. EPA employees will actually be on the site? Does U.S. EPA actually do some of the testing? [A,79,12]

We are concerned about U.S. EPA's power to make sure that the cleanup is done properly. [A,49,21]

U.S. EPA Response:

During the design and construction phases of the project ahead, the U.S. Army Corps of Engineers will have a leading role. In the actual removal and incineration phases of the project, the Corps will procure the contractors and provide the necessary oversight as well. U.S. EPA and Ohio EPA's role will be assure that any public health threat is addressed, that the public is informed of the progress of site clean up and that U.S. EPA's Record of Decision is carried out in full. If the responsible parties implement the cleanup, U.S. EPA and the Corps will provide oversight of all activities pursuant to a court-entered Consent Decree.

It is not possible to estimate how many persons will actually be on site during any one phase of the remedial action.

Contingency Plans

Comment: I am concerned that U.S. EPA's Proposed Plan does not contain contingencies to address problems that may still occur. For example, suppose that during the excavation process some of the drums burst, what would happen? [A,33,24]

U.S. EPA stated that if something unexpected happens it will be eventually detected through monitoring activities. We are concerned about residents in the area of the site in the event that something happens, like leaking toxic vapors. What happens to nearby residents until the excavation takes place? [A,35,5] If something goes wrong at the site, say that gas is coming off the site at a higher level than it should, we want to know that U.S. EPA won't delay in fixing the problem. [A,51,24] We are concerned about your contingency plans so that we can be assured that the cleanup will be conducted properly. [A,69,18]

U.S. EPA Response:

During the remedial design, contingency plans will be prepared to handle emergency situations which may occur during the remedial action. As soon as an emergency situation was detected, which would entail excavation or some other measure, residents would be notified. The U.S. EPA would not neglect to tell residents of an emergency situation as its purpose is to protect human health and the environment.

Once the remedial design is completed, prior to beginning the remedial action, the design plans and related documents will be made available to the public at the repository located in the Kingsville Public Library.

General

Comment: Alternative #9 says that you are going to prohibit the use of the water wells. Is that what you're going to do? Everybody has a well. [A,72,3] The fact sheet says,"...EPA would prevent the use or installation of groundwater supply wells in the area of the site..." [A,72,15]

U.S. EPA Response:

The use or installation of drinking water wells located in the contaminated aquifer will be prohibited. If contamination related to the site is found in residential drinking-water wells, the U.S. EPA, in conjunction with the Ohio EPA, will provide an alternate drinking-water supply. The actual extent of the contaminated ground-water plume will be better defined after completion of the additional ground water study.

Comment: I would like to know why U.S. EPA does not give the community any direct answers. U.S. EPA says "I'm not sure," or, "we're going to have to monitor more." Why doesn't U.S. EPA have someone talk to the community who knows more about the site and understands the issues. [A,88,23]

I think that the representatives from the U.S. EPA here tonight have tried to divide and conquer these people by stating, "that later on we will answer your questions on a one-to-one basis."

It is really hard for me to be in favor or not in favor of a remedial plan when we don't have any specific information. U.S. EPA can't tell us where the trenches are going to be placed or the location of the plume. How can the community make a comment on this? We don't know who's going to be affected by this. [A,95,15]

I think that before we accept or disapprove anything we should have a field representative or an engineer from the U.S. EPA who is familiar with this area, who is familiar with the dump, who knows what's going on, to come out and explain the issues to the people of Kingsville. [A,100,11]

When such time as you people come back with a solid workable plan then I'll give a comment on whether I feel it's to my benefit or not. I believe that you should have another meeting when you come back with a solid plan, not just a proposal. [A,102,11]

U.S. EPA Response:

At the public meeting, the only types of questions which U.S. EPA deferred to be answered later or were not able to answer were either specific questions posed by residents living near the site, i.e., issues such as standing water in their backyards, and specific questions on the remedial action, or the location and type of incinerator to be used on-site. Information about residential concerns was not known prior to the meeting. If U.S. EPA and Ohio EPA had been aware of these concerns prior to the meeting, these questions could have been researched. The design specifications of the remedial action will be developed during the remedial design phase. Therefore it was not possible during the Proposed Plan public hearing to tell the community exactly where the interceptor trenches will be located, or what type of incinerator will be used on site, and what type of scrubber it will have. During the remedial design phase all the specifics of the remedial action will be decided. Once the remedial design is completed the remedial action cleanup of the site will begin.

The RI and Feasibility Study (FS) identified the type of contamination at the site, what media have been affected by the contamination, and the general extent of migration of the contamination. Using this environmental data, the U.S. EPA and Ohio EPA developed a Proposed Plan which outlines the best way to address the contamination at the site. During the Proposed Plan and public comment period, the Agencies asked the public to comment on the concepts presented in the Proposed Plan. The information currently available will be fine-tuned during the remedial design to gather engineering data, such as exactly where to place the trenches and what type of incinerator will best handle the wastes at the site.

U.S. EPA's Remedial Project Manager and Ohio EPA's Project Coordinator designated for the site are the technical contacts. They oversee all work done at the site, solve problems which arise, and review all documents produced, in general, manage the site.

Comment: Was there a fire on the site about 10 to 12 years ago? If so, what effect would the fire have on conditions at the site? [E]

I've seen the landfill, or have heard of the landfill on Creek Road being ablaze, on fire.

U.S. EPA Response:

The only information located about a fire in the area was one which did not occur at the Big D Campground site. Fiberglass wastes were dumped alongside Conneaut Creek at a site on Creek Road approximately one mile west of the Big D site. That site apparently caught fire several years ago.

Comment: We are concerned that U.S. EPA will pick another less protective alternative for addressing contamination issues at the site. [A,41,7] If funds run out, U.S. EPA may pick a cheaper remedy. [A,43,2]

U.S. EPA Response:

The Proposed Plan discusses U.S. EPA's preferred alternative for cleaning up the site. Once the Record of Decision (ROD) is signed the remedy is finalized and cannot be changed without notifying the public, beginning a second public comment period for the new remedy and signing another ROD.

If funding problems occurred, the remedial action may be slowed but U.S. EPA would not choose a cheaper remedy simply to save money. The remedy chosen with this ROD is the most cost effective and protective of human health and the environment.

SECTION 2: SUMMARY OF OLIN CHEMICALS CORPORATION COMMENTS AND U.S. EPA RESPONSES

Acetone

Comment: The organic compounds detected in the deep wells are primarily acetone, methene chloride, and chlorobenzene. Section 4.3.3 of the RI report notes that acetone, methylene chloride, chlorobenzene, toluene, and trichlorethylene were detected in some field and/or laboratory blanks up to 305.8 ppb of total VOA's. Acetone was used as a rinse in decontamination of ground water sampling equipment. This is especially troubling since acetone is the compound reported in the highest concentrations and with the greatest frequency in the deep wells. [B,2]

U.S. EPA Response:

Only one field blank sample had other organic compounds than acetone and methylene chloride (field blank sample BD-FB2-01). This was a field blank of a bladder pump which was not used in sampling any of the deep wells. As stated in the RI report, the compounds found in field blank samples were compared to the analytical results and, when appropriate, the analytical results were eliminated from consideration. Furthermore, neither acetone, methylene chloride, or toluene were used in calculating potential risks.

Comment: Section 4.3.3.3 of the RI states "Acetone, a common field and laboratory contaminant was the only compound detected during both sample rounds in a single deep well." If acetone is not included, the detected total VOA concentrations in the deep wells exceed 10 ppb only in one sample (34.2 ppb in the first sample from Well 4D). The latest measurement from Well 4D was 0 ppb. [B,3]

U.S. EPA Response:

Table 4-5 in the RI report identifies acetone separately in the distribution of organic contaminants at the site. Total VOAs are not listed. As stated above, acetone was not used in calculating potential risks.

Ground Water

Comment: Chemical data presented in the RI report about ground water from the confined bedrock aquifer raises serious concerns with respect to the validity of the RI data. Specifically, we are concerned about the following:

1. **Validity of the ground water samples and analysis from the deep wells (those screened in the unit designated the confined bedrock aquifer) is questionable.**

2. **Significance of the low, inconsistent concentrations detected in the deep aquifer is doubtful.**

3. **Temporal patterns in the data suggest that the concentrations in ground water from the deep wells may result from residual contamination introduced to this depth by drilling for installation of the monitor wells.**

4. **Well development was not sufficiently defined and may not have been properly done. [B,2]**

U.S. EPA Response:

U.S. EPA does not believe that there is any problem with the data obtained from deep wells.

The significance of low concentrations of contaminants found in the deep aquifer is important. Tetrachloroethene found in one deep well has a 5.1 x 10^{-5} cancer risk.

All deep wells were constructed by properly casing off the upper aquifer followed by continued drilling into the deep aquifer using equipment not used in the water table aquifer (as discussed in Appendix A of the RI report). Temporal patterns may be indicative of pulses of contamination being released from the landfill. Well 2D showed an increase in chlorobenzene concentrations between round 1 and 2.

Wells were developed using a surge block coupled with repeated bailing and pumping (as discussed in Appendix A of the RI report). U.S. EPA believes well development was conducted properly.

Comment: The spanned period of four months, for well sampling and analysis, is insufficient to make ground-water quality conclusions. The data for repeated samples from any single deep well is inconsistent. For example, subsequent samples resulted in the following total VOA concentrations.

- **well 1D 0 to 76 ppb**
- **well 2D 1,100 to 118 to 0 ppb**
- **well 3D 628.6 to 48 to 0 ppb**
- **well 4D 71.2 to 900 to 0 ppb**
- **well 5D 5,922 to 0 ppb**
- **well 6D 430 to 38 ppb [B,3]**

In the last ground-water sampling event, four of the six wells did not report any detectable VOAs. Even if the sampling and analysis results were not of

questionable validity the data would not necessarily demonstrate contamination of the confined bedrock aquifer. The data for total VOAs listed above illustrate a general trend of decreasing concentration with succeeding samplings.

U.S. EPA Response:

The deep well analytical results are not inconsistent. As discussed above, it is not unusual for contaminants in the ground water to move in pulses which will vary the concentration of contaminants found in the ground water throughout the year.

In addition, the total VOA concentrations listed in this comment are not correct. Wells 2D, 3D, and 4D did not show 0 ppb total VOAs in the last sampling event. As discussed in the footnotes of Table 4-10 of the RI report, these samples were analyzed for extractables but not analyzed for volatiles.

Comment: Dedicated sampling equipment should have been used to avoid problems of equipment contamination during sampling. Because of the presence in the blank samples of the same contaminants reported to be present in the samples and the inconsistent results from repeated samplings, the ground-water sample and analysis results do not indicate significant concentrations of organics in the deep ground water. [B,3]

This suggests that the detected organic compounds could be the result of contamination from shallower zones that was carried into the deeper aquifer during drilling for installation of the deep monitor wells. Repeated purging and sampling of a well would gradually reduce the constituent concentrations resulting in lower detected concentrations with repeated samplings and perhaps invalidate the conclusion that no deep contamination exists. [B,4]

U.S. EPA Response:

The field blank sample which showed organic compounds other than methylene chloride and acetone (BD-FB2-01) was a sample from a bladder pump. This sampling pump was not used to sample the deep wells. All other field blank samples indicate that decontamination procedures were adequate and did not introduce organic compounds into the samples (with the exception of acetone and methylene chloride which are common lab contaminants).

Comment: It should be noted that in comparing production well contaminant concentrations with site monitoring-well concentrations in the same aquifer, lower concentrations may occur in dynamic systems such as production wells in comparison to stagnant systems such as monitoring-wells. The use of monitoring well data applied to production well consumption may overstate the health risk. [B,15]

U.S. EPA Response:

In order to prevent sampling of "stagnant systems", purging is done prior to sampling. Furthermore, MCLs are based on water quality from a "tap" or faucet.

Comment: The data in Appendix C of the RI report does not indicate the volume of water that was removed from each well during development and during purging for each sampling event. This information is necessary to evaluate the validity of the ground water samples. [B-4]

U.S. EPA Response:

Five to 40 gallons of water were removed from the deep wells during development, 15 to 60 gallons were removed from the shallow wells during development, and 25 to 70 gallons were removed from the creek wells during development. The exact quantity removed was dependant on well yield. In all cases, wells were developed until the water form the wells was clear and as sediment-free as possible. Conductivity, pH and temperature were also monitored.

Comment: Boreholes 2D, 3D, and 4D were advanced 10 to 20 feet deeper than the planned well depth. On attempting to plug the bottom of these boring cement bentonite grout rose in the borehole through the screened interval, Borehole 2D was apparently properly plugged and abandoned and the well was installed in a new borehole adjacent to the first location. Borehole 3-D, however, was drilled out using a core barrel. Borehole 4-D was flushed with water to remove the rout. The adequacy of the measures for wells 3-D and 4-D is questionable and residual grout in the wells may impact quality of water samples from these wells. The procedure used for the borehole 2-D should also have been used for 3-D and 4-D. [B,4]

U.S. EPA Response:

The U.S. EPA decided not to abandon and redrill wells 3D and 4D because the wells were able to be redrilled through the grout (3D) and flushed (4D). It was determined that the presence of grout would not impact the quality of samples acquired from these wells.

Comment: Northward movement of shallow ground water is stated as fact. This is not documented and is not justified by the data in the RI report. Table 3-1 (p.3-16 of the RI report) shows some higher ground water elevations north of wells 1S, 5S and 4S. For example, water levels in 3S, the northern most monitor well, and RW3 (a residential well located about 600 feet north of the reported ground water divide at the site) were 712.90 feet and 719.83 feet, respectively, on September 26, 1987, and higher than the wells immediately to the south. In fact, the ground water elevation was higher in the northern most shallow monitor well, MW-3S, than in well to the south of it on four of the six dates on which ground water elevation measurements were reported. Ground-water elevation in RW3 was 720.07 feet msl on May 16,1987, higher than monitor wells located to the south. Furthermore, it is difficult to predict a contour of 714 feet as shown in Figure 3-3 (p.3-8 of the report) with the existing ground-water elevation data. This contour was drawn considerably north of well 3S, the northern most monitor well and the northern most data point. Also, the water level around the 712 feet contour line in Figure 3-4 (p.3-9) can be interpreted in other ways. For instance, an east-west trough could exist instead of a closed depression. [B,8]

U.S. EPA Response:

U.S. EPA interprets ground-water movement in the water table aquifer is to the north. This is substantiated by the water level measurements taken in monitoring wells on-site, and presented in Table 3-1 of the RI report. Water level measurements obtained from residential wells are not used to contour ground-water flow because the ground water in residential wells has different characteristics from ground water in monitoring wells on site (determined from review of inorganic data and the use of modified stiff diagrams). In addition, northern flow of the shallow ground water is substantiated by the presence of contamination from the landfill being detected in all shallow ground-water monitoring wells north of the landfill.

Contour line 714 on Figure 3-3 of the report was drawn only 75 feet north of well 3S and was estimated using standard contouring techniques. Contour line 712 on Figure 3-4 could indicate and east-west trough but is not supported by any data collected during the RI. The U.S. EPA believes that the ground-water flow interpretations presented in Figures 3-3 and 3-4 are appropriate.

Comment: In the modeling of the plume, it has been assumed that the water table aquifer is infinite in extent. This assumption is contradictory to the actual physical characteristics. In fact, data were not presented that verify that the aquifer is continuous in the area included in the model. Also the model did not account for the vertical recharge from the surface. [B,11]

U.S. EPA Response:

The model was used as a tool to estimate the extent of contamination based on existing site data. The assumption of an infinite aquifer and no vertical recharge are common assumptions in analytical models. These assumptions were noted in the selection of the model and the results are accordingly used as just one tool in remedy selection.

Comment: The Princeton Model is limited to modeling a single source with a single ground-water flow direction. The study used a combination of results from multiple model runs as a weighted average of concentration with respect to discharges from the two source areas. Theoretically, since it is not based on solute mass balance or mass conservation, the weighted average concentration may deviate remarkably from the true value at each location. It is, therefore, essential to verify the results by running other models (analytical or numerical) and comparing the results. No indication of model verification was submitted.

In light of the above, we suggest that the following be considered further:

1. Obtain water level data for additional dates and provide more data points further north.

2. Utilize another analytical model to verify the Princeton Model's results with the same given assumptions;

3. After adequate data is obtained, refine the assumptions and use other analytical or numerical models to obtain results based on more realistic physical conditions. A numerical model or combination of analytical and numerical models is highly recommended since it can better simulate the subsurface conditions at the Big D site;

4. Sensitivity analysis of the responses of ground water flow and contaminant transport with respect to changes in the hydrogeological parameters is essential since the input values are based on assumed values and may differ very significantly from the actual conditions. No sensitivity analysis is reported in the RI. [B,12]

U.S. EPA Response:

Confirmation of ground-water data was not determined to be necessary during the RI/FS because U.S. EPA will be obtaining further information on ground-water flow and the extent of the plume during a pre-design study, as discussed in the FS and ROD. This study will involve confirming what was presented in the RI report, south of the site, and installing and sampling additional monitoring wells which will better define the geology north of the site, the ground-water flow, and how far contamination has migrated from the site.

The study will initially concentrate on the area north of the site where the plume may have migrated. This area will be determined based on ground-water modelling and results from the last round of ground-water sampling during the RI. If ground-water contamination has not migrated to this theoretical point, additional wells will be installed closer to the source area until the boundary of the plume is identified. Conversely, if contamination has migrated beyond the theoretical limit, additional wells farther from the source area will be installed in order to place bounds on the location of the plume. The full extent of migration will be established prior to designing the ground water collection and treatment system.

Comment: The estimated extent of shallow ground water contamination to the north of the site is based solely on the predications from the analytical model and actual ground water data are limited to the southern edge of the area modeled. Contradictions exist between the model and the available data and numerous unverified assumptions are present in the analytical model and the estimation of contaminant extent. Evaluation of the extent of contamination requires collection of actual hydrogeologic and water chemical data within the area modeled. The actual extent may vary significantly from what has been predicted in the RI report, as is indicated by the available data for residential wells. [B,13]

U.S. EPA Response:

The limitations of the ground-water model are discussed above. We agree that residential well water quality data does not support the northern extent of the plume. That is the purpose of the pre-design ground water study which the U.S. EPA will conduct to define the extent of the contaminant plume. Based on the information gathered during this study, the actual placement of collection trenches and extraction wells can be designed.

In addition, soil gas sampling was conducted to assist in verifying the location of the modelled plume. This investigation detected target compounds in the soil gas in areas of the predicted plume extent north of any ground-water sampling point (see Appendix J of the RI report).

Comment: Table I of Appendix H of the RI report lists the ground water velocity used in the model as 3.64 x 10^5cm/sec. This equivalent to about 1,030,000 feet per day. Presumably this is a typographical error. What ground water velocity was used? [B,13]

U.S. EPA Response:

The correct velocity used in the model is 3.64 x 10^{-5} cm/sec.

Comment: The data presented in the RI report is not adequate to verify that the shallow aquifer is continuous to the north of the site. Additional measuring points are necessary to define the direction of the ground water movement from the site. [B,8]

U.S. EPA Response:

It is appropriate to assume that the aquifer is continuous because there is no evidence to indicate otherwise. As discussed above, an additional study of the extent of the plume, the ground water and the geology north of the site will be conducted during a pre-design study prior to finalizing the remedial design.

Comment: Page 3-7 of the RI report states that since the unusually low water table elevations in the fall do not represent normal site conditions, ground-water flow systems have been discussed using May 1987 data. If this is the case, ground-water flow to the north would be primarily uni-directional as indicated by Figure 3-3. This is contradictory to the two-lobed contaminant plum used in the analytical model and depicted in Figure 4-6 (p.4-19 of the RI report). The pattern of a two-lobed plume could be simulated under the initial condition of two-directional ground water flow as depicted in Figure 3-4 (p.3-9 of the RI report). With the available data, the conclusions arrived at on p.3-7 and p.4-18 of the RI report regarding the northward movement and the two-lobed plume are not substantiated. It should be noted that seasonal fluctuations in the ground water elevation occur even in normal precipitation years and the measurements during the RI may reflect normal trends although the actual elevations would vary from year to year. It is possible that the northern portion of the site exhibits a seasonal reversal of flow direction. [B,8]

U.S. EPA Response:

The flow direction in figure 3-3 and 3-4 are not markedly different. The test pit investigation indicated the presence of two separate source areas which are divided by undisturbed soils. In addition, ground-water level measurements and contamination detected in all wells north of the landfill indicate northern movement of ground water. The presence of a northern plume of contamination was verified by soil gas sampling. If a seasonal reversal of flow direction does occur, it does not change any conclusions reached by U.S. EPA.

Comment: Page 4-12 of the RI report states that well RW-3 "is probably not screened in the same water bearing unit as the monitoring wells at the Big D site. Well construction, recharge rates, and static water level indicate this well receives water from a localized perched water table zone." The basis for this conclusion is not documented in the RI. The data presented in the RI report (Table 1 of Appendix C) does not distinguish the aquifer at RW-3 from that at RW-1, RW-2, RW-4 and the onsite monitor wells completed in the water table. Table 1 of Appendix C (see volume II of Final RI Report) lists RW-3, RW-1, RW-2 and RW-4 as screened in the overburden (assumed based on discussions with owners). No hydrogeologic analysis or other data is presented to indicate that RW-3 is not screened in the same aquifer as the other residential wells or the shallow onsite monitor wells. The ground water elevation in RW-3 is higher than in the northern most shallow onsite monitor wells and this may reflect a ground-water elevation surface for the water table different from that assumed in the RI rather than necessarily indicating a different aquifer. It should be noted that the RI report also indicates that the water table aquifer onsite is a perched aquifer in the over burden. [B,8]

U.S. EPA Response:

The discussion regarding the water-bearing unit in which RW-3 is screened, applies to all residential wells. The discussion on page 4-12 of the RI report only mentioned well RW-3 because inorganic contaminants were detected in this well. The basis for the conclusion is information obtained by utilizing modified stiff diagrams which indicate a different ground water chemistry in residential wells compared to on-site monitoring wells. The water table aquifer on-site is not a perched aquifer because an unsaturated zone does not exist below this aquifer. However a perched water table aquifer was discovered during the soil gas investigation at sample number SG-19 (see Appendix J of the RI report, p.4).

Comment: According to the RI report, one of the stated reasons for the two-lobed contaminant plume is surface water recharge from the drainage swale at the northern end of the site. If the drainage swale is a significant source of recharge, the local ground water flow would be expected to be southward from the south side of the swale and northward from the north side of the swale (i.e., a ground water divide). This is contradictory to the statement in the RI report that ground water moves northward. [B,10]

U.S. EPA Response:

The effect of the drainage swale does not appear to be significant in altering ground-water flow to a degree which could be seen in ground-water elevations obtained during the RI. However, as stated in the RI report, the drainage swale may be one reason for the two-lobed plume.

Comment: Residential well RW2, located at 3700 Creek Road, does not show any chlorobenzene contamination or other contamination believed to come from the site. However, Figure 4-6 shows that the computer simulation predicts that there is about 3mg/l of chlorobenzene in the vicinity of RW2. The detection limit for chlorobenzene is .005mg/l. The accuracy of the transport model is implied in the RI report to be about one order of magnitude, but in this case is in error by at least a factor of 600. The assumptions on which the model is based may not be valid. [B,10]

U.S. EPA Response:

This comment is not clearly understood because RW2, located at 3700 Creek Road, is not shown on Figure 4-6 of the RI report. U.S. EPA assumes that this is a typo, and the comment applies to RW3.

RW3 was not installed by U.S. EPA and is therefore not constructed for the purpose of monitoring the water table aquifer. As discussed above, evidence indicates that this well in installed in a perched aquifer above the water table aquifer.

Soil

Comment: Two background soil samples were collected, both from the same location. The RI then states that "As shown in Table 4-1 the highest borehole concentrations for all compounds except silver exceeded the concentrations detected in the two background samples. The highest concentrations of each inorganic compound detected in the test pits exceeded the concentrations in both background samples with the exception of antimony, arsenic, beryllium, cobalt, iron, cyanide, selenium, thallium, and vanadium." These are true statements, however, it should be noted that this does not necessarily indicate elevated concentrations in the soil borings and test pits relative to the two background samples. Most of the inorganic constituents analyzed are present in varying concentrations in soil samples as a result of natural processes. The naturally occurring concentrations will vary from location to location and will exhibit a statistically distributed range of values which is dependent on the number of samples of the total population of samples which have been analyzed. That is, if the range for a very small number of samples is compared to the highest value observed from a much greater number of samples collected from the same population, it is expected that some values will exceed the range of the small number of samples. Since many more samples were analyzed from boreholes and test pits than from background locations, it should be expected that some values will exceed the range exhibited by the background samples. Note that the lowest concentrations of the borehole and test pit samples for the inorganic constituents are also lower than or equal to (for not detected) that lowest values for the two background samples. The comparisons used and conclusions reached are statistically invalid. [B,10]

U.S. EPA Response:

Inorganics in the soil pose no significant risks with the exposure scenarios evaluated for this site.

Comment: Soil gas concentration contours have not been provided to help evaluate the validity of the estimated extent of the ground-water contamination plume, as shown in Figure 4-6 of the RI report (p.4-19). Further verification of the results is necessary. [B,11]

U.S. EPA Response:

Limited sampling points, extreme stratification of the soils, and wet conditions prevented U.S. EPA from confidently contouring soil gas data.

As state above, additional pre-design studies of the ground water north of the site will be conducted.

Risk

Comment: For Tables in chapter 6, the upper bound excess lifetime cancer risk value mathematically should be reported with three significant digits to obtain more uniform calculation results. Also, in the selection of soil ingestion rates - the soil ingestion values presented in the EPA Superfund Exposure Assessment Manual (SEAM) p. 168, Table A-5 are presented by age group and are more accurate. The information in this reference also provides time periods for various ingestion rates making the assumption of years of soil ingestion unnecessary. [B,13]

The worst case soil ingestion of $1x10^{-3}$ was selected. Is the basis for selecting this value valid? See page 6-5. [B,26]

U.S. EPA Response:

The Superfund Public Health Evaluation Manual (SPHEM) suggests that the upper bound cancer risk be reported with one significant figure. The assumption for soil ingestion and the use of a $1x10^{-3}$ kg/day soil ingestion rate are based on a U.S. EPA directive issued on January 27, 1989.

Comment: The scenario used regarding direct contact with contaminated soils extent of exposure (p.6-6) assumes that future direct contact with soils will involve soil up to 8 feet below the ground surface. The basis of the assumption (depth of 8 feet rather than surface soil) needs to be presented. Use of surface soil would probably result in significantly lower exposure. The exposure via this pathway is zero. [B,14]

U.S. EPA Response:

The assumption for future soil exposure assumes that houses will be constructed at the site and soil will be excavated to eight feet to install a basement (p. 6-2 to 6-3 in RI).

Comment: On page 6-6 of the RI report, the potential dermal exposure is estimated to be 1 mg soil/cm^2 body area. This estimate is high, a value of 0.6 mg soil/cm^2 is more accurate (Lepow, 1975). The value of 1 mg soil/cm^2 overestimates the health risk and this should be stated. The Superfund Public Health Evaluation Manual (SPHEM) states that the uncertainties of each assumption make during the risk evaluation process and the resulting over or underestimation of health risk must be clarified. Evaluation of the impacts of assumptions was not made for any exposure assumptions. [B,14]

U.S. EPA Response:

The U.S. EPA chose the value of 1 mg/cm^2 to be a median value. The commentor cited a value of 0.6 mg/cm^2 while U.S. EPA's Superfund Exposure Assessment manual cites (Harger 1979) values of 1.45 mg/cm^2 for potting soil and 2.77 mg/cm^2 for clay. the U.S. EPA believes 1 mg/cm^2 to be a reasonable compromise between the various literature values.

Comment: The basis for the selection and use of an additional carcinogenic potency factor for calculating dermal exposures was not stated. The impact of the use of these factors in addition to the use of factors developed for ingestion of contaminants on the overall risk estimate was not discussed. [B,14]

U.S. EPA Response:

The use of potency factors for dermal exposures is based on the fact that a percentage of the chemical will pass across the skin and enter the blood stream. Therefore U.S. EPA applied an absorption factor to the dosage calculation which reflected the amount (percentage) that would cross the skin barrier and enter the blood stream.

Comment: It is stated on page 6-11 of the RI report that the sampling results for the residential wells did not reveal any inorganic or organic contaminants that could be attributed to releases from the Big D site. It should have been stated that for incomplete exposure pathways there is no actual risk. (See Reference SPHEM, Page 36, first column, second paragraph). There is no potential risk associated with the site ground water at this time due to an incomplete exposure pathway. Risk is overestimated because it is assumed that the pathway is complete at this point. The potential for future risk exists only if a production well is placed in a location completing the exposure pathway. [B,15]

U.S. EPA Response:

The RI report acknowledges that no one is currently exposed and that the risks are based on the assumption of future exposure. The risks are estimated based on a series of assumptions for future exposures associated with contamination of nearby residential wells or drinking water wells completed on-site or off-site at some time in the future. Actual or threatened releases of hazardous substances from the site may present an imminent and substantial endangerment to public health, welfare, or the environment if contaminants in the landfill and migrating from the landfill are not addressed.

Comment: When referring to risk, it should be clarified in the RI report that the future is based on a period of 70 years for risk assessment purposes, not an infinite time period. [B,15]

U.S. EPA Response:

An exposure may last longer than 70 years. This time frame is used to estimate lifetime risk from exposure. If the source is not removed, it is possible that exposure could continue for longer periods.

Comment: The RI report states that both acute and chronic exposures for the potential ingestion of ground water were evaluated. Only chronic hazard index values can be found in the RI report. [B,15]

U.S. EPA Response:

Only chronic hazard indices were evaluated. The statement "Potential ingestion of ground water ... was evaluated ... for both acute and chronic exposures" (p.6-12 of RI report) relates acute and chronic exposures to noncarcinogenic and carcinogenic effects, respectively.

Comment: For infrequently found contaminants, geometric mean concentrations were not calculated and the contaminant was not evaluated under probable conditions. In order to evaluate these contaminants under probable case conditions, the geometric mean can be calculated utilizing a concentration equivalent to one-half the detection limit for that specific contaminant when there are "non-detectable" levels. This approach more accurately estimates the actual or probable exposure. [B,15]

U.S. EPA Response:

The assumptions used by the U.S. EPA exclude the infrequently found contaminants from analysis under the probable case exposure. This also assumes that these contaminants will not cause an unacceptable risk under the probable case exposure. In addition, risks have already been identified in ground water, this method would only increase the risks already identified.

Comment: It is stated in the RI report that extrapolations from animal studies do not address human-animal differences in absorption. This is not true - all effect levels obtained from chronic animal studies are multiplied by a safety factor of 10 to account for interspecies variation. It is also states that the ACI and CPF calculations assume that the human body absorbs 100% of the contaminant, the same extent as an experimental animal. For most compounds this is not true. The reasons for excluding the percent contaminant absorbed in equations 6-1 and 6-2 in the RI report are not satisfactory. However, by assuming 100% is absorbed, the estimated dose is higher and the calculated risks are more conservative. [B,16]

The RI states that 1% inorganic and 5% organic dermal exposure assumptions would be used, these percentages are used in equations 6-1 and 6-2 in Appendix H of the RI report. [B,16]

U.S. EPA Response:

The assumption made by U.S. EPA was that no adjustment in the dosages for ingestion exposure would have to be made to account for the absorption rate in man. The ACI and CPF are based on a dose ingested or administered not on a dose absorbed into the blood stream. Although 100% is absorbed into the blood stream, the U.S. EPA assumed that inorganic contaminants would absorb into the blood stream at a rate that is one percent of the rate of absorption via ingestion. This absorption for organics was five percent.

Comment: The BCF values quoted for chlorobenzene range from 10 to 4185. A value of 465 was selected and the basis for this selection is not stated. A more conservative approach would be to use the highest value. Recalculations using BCF of 4185 gives a HI of 0.32 which is still in the acceptable range. [B,16]

U.S. EPA Response:

The BCF chosen by U.S. EPA related to the species found in Conneaut Creek.

Comment: In chapter 6 of the RI report, the estimated dose and HI should have been calculated for barium, lead, and beryllium. [B,16]

U.S. EPA Response:

The U.S. EPA felt that it was appropriate to only perform qualitative analysis of these contaminants due to a lack of good BCF data for these metals.

Comment: The estimated dose for chlorobenzene is 9.5E -01 not 9.21 E 01 mg/kg. (See page 6-16 of the RI report) The HI is 3.5 E -02 not 3.4 x E -02. [B,17]

U.S. EPA Response:

The error is noted. The risk is still not significant.

Comment: In Appendix H of the RI report it is stated that exposure dose is equal to 10,230 mg/kg exposure dose should equal 10.230 mg/kg or 10,230 ug/kg. [B,17]

U.S. EPA Response:

The exposure does should be 10,230 ug/kg/day and this value was used in all calculations.

Comment: A discrepancy exists in the average body surface area of a child used in the risk assessment. Although EPA (1985) stated the average surface is 1200 cm^2, the 1988 Superfund Assessment Manual (Page 127) quotes that the dermal area of a child is 9400 cm^2. [B,18]

U.S. EPA Response:

The difference between sources is noted. However, the existing risk is well below the acceptable range and using the newer value would lower the dose and resultant risk even further.

Comment: The derivations and calculations of the carcinogenic potency factors and noncarcinogenic acceptable daily intake values should be discussed in more detail. In addition a discussion of the safety factors included in the calculations should be included. This information is necessary to determine the validity of the conclusions. [B,18]

U.S. EPA Response:

Since this information is readily available from U.S. EPA's IRIS data base, it was not included within the report.

Comment: Two of the ADI values i.e. those for barium and beryllium which were used in the study differed from the values quoted in the 1986 EPA Exposure Manual. If some other source was used, it should be referenced. In the case of barium, the value differed by 11% but in the case of beryllium, the figure used, 5.00E-03, was one order of magnitude less sensitive than the value of 5.00E-04 quoted in the 1986 EPA manual. In the text it was inferred that a 1987 revision of the Toxicity data was the source of some of the ADI values. A full reference to this manual was not made as a footnote to the appropriate tables. [B,18]

U.S. EPA Response:

The full reference is given under footnote (a) in the table.

Comment: Risks were evaluated on future site use (residential scenario). Risk associated with present use needs to be discussed.

U.S. EPA Response:

At present none of the residential ground water wells at the site are contaminated with chemicals related to the site. Therefore, no completed

human exposure route exists at the Big D site and no risks were calculated for present exposures.

Comment: **The procedure to calculate the exposure dose is different - the intake factors defined below are not the same. Why are these values different?**

$$\text{Intake factor} = \frac{\text{exposure dose}}{\text{maximum concentration}}$$ [B,25]

U.S. EPA Response:

U.S. EPA followed the general procedures for calculating exposure dosages found in U.S. EPA's Superfund Health Evaluation Manual. This document calls for two different methods for calculating dosages - one for exposure to non-carcinogenic chemicals and another for exposure to carcinogenic compounds.

Comment: Calculations for worst and probable case conditions for soil ingestion utilized maximum and mean concentrations as well as frequency of exposure. Calculations for worst and probable case conditions for water ingestion utilized maximum and mean concentrations and frequency of exposure was excluded. The use or non-use of a frequency factor requires explanation. [B,25]

U.S. EPA Response:

The U.S. EPA assumed that the water ingestion would be relatively uniform in the exposure scenarios given and therefore did not include frequency of contact as a factor in the calculations.

Comment: It is stated that the environmental exposure considered the most likely to occur is the ingestion of aquatic life that inhabits Conneaut Creek. No rationale was presented to support this statement, nor was the risk for this exposure route calculated. Please explain. [B,25]

U.S. EPA Response:

The exposure route at the site that could occur under the present conditions is the ingestion of aquatic life. People catch and eat fish caught in Conneaut Creek. As discussed in the RI report the potential risk to human health from ingestion of aquatic life from Conneaut Creek is virtually zero.

Comment: The rationale for including the factor frequency of contact (days) in the exposure dose equation of 365 days (6-1) is not clear. Frequency of exposure is not generally considered in calculating a hazard index. [B,26]

U.S. EPA Response:

Since U.S. EPA focused on the chronic exposure to non-carcinogenic chemicals, the EPA felt that it was appropriate to average the exposure dose over a one-year (365 days) exposure. It was felt that if the dose was calculated by not taking into account frequency of contact this could overestimate the exposure to these chemicals.

Comment: The WQC for chlorobenzene was quoted as 7.2E-04 ug/L for consumption of drinking water and aquatic organisms and 7.4E-04 ug/L for the consumption of aquatic organisms only from a 1980 EPA reference. A more recent reference, EPA SPHEM, 1986, gives WQC value of 488 ug/L for chlorobenzene for both consumption of aquatic organisms and drinking water and for the consumption of drinking water only. [B,26]

The WQC for chlorobenzene taken from a 1980 EPA reference is 7.2E-04 and 7.4E-04. The EPA manual gives a value of 488. [B,26]

U.S. EPA Response:

The mistaken value reported was for hexachlorobenzene, the correct value for chlorobenzene is 488 ug/L. The correct value was used in the comparison, so no change in the text is needed (see p. 6-26 of RI report).

Test Pits

Comment: On page 4-3 of the RI report it is stated that "based on the results of the test pit excavation the estimated volume of contaminated fill is 25,000 to 35,000 cubic yards." Were the fill estimates actually made from conversations with the transporter, from the geophysics, or from the test pits? It is not clear. The actual calculations and assumptions used should be presented. [B,19]

On page 4-3 of the RI report landfill volumes are "estimated from the geophysical survey to be 35,000-52,000 cubic yards." There is no discussion upon which that statement is based. [B,19]

U.S. EPA Response:

The estimated volume and location of the source area is based on information from the transporter, the generator, geophysical survey, and test pits. The actual volume will only be known when excavation is complete.

Comment: On page 7-1 of the Summary of Conclusions of the RI report, the statement is made "Based on the geophysical survey and the test pit excavation results, it is estimated that there are two source areas with a combined volume of 25,000 to 35,000 cubic yards." Supporting documentation for this conclusion was not found. [B,19]

U.S. EPA Response:

The estimated volume of the source area is discussed above. The identification of two possible source areas was determined based on the test pit investigation. The test pit investigation indicated the presence of two separate source areas which are divided by undisturbed soils. However, this will not be confirmed until excavation is in progress.

Drums

Comment: In the FS report, several references to the RI report are made (pp. ES-3, 1-31, 2-5, etc.) stating "that 2,500-5,000 drums may be buried within the suspected drum boundary" inferred from the aforementioned fill volumes. No documentation correlating either the geophysical results to the fill volumes, or the geophysical results to a total number of buried drums was presented in the RI or FS reports. Again, the calculations and assumptions used to obtain this estimate should be provided. Also, the geophysical survey detects metal pieces, rods, etc., which might be present in the soil. These might influence the results to a great extent and might have erroneously been interpreted as indicating the presence of drums. The report makes no mention of such possible errors. [B,20]

U.S. EPA Response:

The number of drums estimated to be in the source area is based on discussions with the transporter. The transporter indicated that from the mid-60s to the mid-70s, he may have transported over 6000 drums of liquid to the site. The test pit investigation indicated that fewer drums may be in the source area. For estimating purposes, a range of 2500 to 5000 drums was selected. Until the landfill is excavated, the exact number of drums can not be determined.

Remedial Alternatives

Comment: Table ES-1 indicates that alternative 6, source area containment, treatment of ground water outside contaminated area, complies with all ARARS and is protective for soils and ground water. It also indicates that it is easily implemented with proven technologies. Table ES-1 indicates that alternatives 2 and 6 have minimal risk during remediation, alternatives 4 and 8 have moderate risk and alternatives 3, 5, 7, and 9 have high risk. Alternative 6 also is indicated as requiring relatively short time to implement. Of the alternatives developed in the FS, Alternative 6 appears to have distinct advantages during the remediation when the risk for release to the air of relatively high concentrations of contaminants is much lower than for other alternatives. The only disadvantage listed for Alternative 6 relative to some other alternatives is that the long term risk (presumably of release of slow moving contaminants to ground water) is expected to be higher. Such releases can be detected by monitoring and since the ground water moves very slowly, allows considerable time for corrective measures before human exposure would occur. The short term risk of exposure to relatively high concentrations from fast moving air releases during alternatives requiring extensive excavation allows little time for response and appears to represent the greater risk to human health. [B,20]

U.S. EPA Response:

U.S. EPA has determined that the selected remedy is the most appropriate solution to remediate the contamination at the site. The selected remedy is the most protective of human health and the environment, eliminates long term risks, reduces toxicity, mobility and volume, is easily implemented and complies with ARARs. The selected remedy poses risks to the public and workers during implementation of the source area excavation and incineration (2 to 2.5 years duration) however, these short-term risks can be reduced by application of engineering controls and, once the incineration is completed, the risks from the source area are eliminated. Alternative 6 does not reduce toxicity or volume of the source area and does not provide long-term protectiveness of human health and the environment because the source area will not be removed. Slurry walls have an expected lifetime of 30 years. If a breach of the slurry wall occurs, ground-water monitoring should detect it. However, as long as source materials are allowed to remain within the water table the chance for migration exists. Numerous reconstructions of the containment system may need to be implemented before the total risk is gone. With the selected remedy, once the source area is removed no additional releases of contamination could occur and the direct contact of source materials with the water table is removed. Only contamination which has already migrated from the source area would need to be collected and treated. And, once the source area is removed and incinerated and ground water risk objectives are met, long term monitoring will not be necessary.

Comment: Onsite incineration will require a high volume flow of water for operation. The discussion of incineration does not identify the source or discuss the availability of this water and the associated cost. Ready availability of this volume of water is questioned since discussion of a soil bentonite slurry wall barrier on page 3-55 indicates that water for construction of the slurry wall would have to be obtained from an unspecified off site location. Availability of the larger volume of water for onsite incineration is thus questionable. [B,21]

U.S. EPA Response:

The volume of water required for incineration cannot be determined until the incinerator is selected during the remedial design. The source of water needed for incineration will be determined during the design phase of the remedial action.

Comment: During screening of remedial technologies all solidification/stabilization techniques except in situ vitrification were eliminated. It appears that one technology was not considered and that other technologies were eliminated without adequate test data. The technology now exists to use large diameter augers through which a stabilization fixation slurry is pumped. The auger mixes the slurry with the waste material and contaminated soils, drums would be ruptured and the contents fixed within the slurry. This technology is not subject to the same limitations as the other solidification/stabilization technologies listed on Figure 2-1. In addition, other stabilization techniques were eliminated based on questions of effectiveness and possible leaching. Bench scale tests should have been completed prior to elimination to determine if effective treatment mixes are available. In addition, excavation and offsite incineration of intact drums combined with stabilization of the soil and ruptured drums should be considered. It does not appear that these alternatives were considered. [B,24]

U.S. EPA Response:

The solidification technologies suggested are not proven technologies and were eliminated from further consideration for that reason.

Comment: Neither the description of each alternative nor the cost estimate table for each alternative present adequate detail to determine if all essential elements of the alternative have been considered and to determine if the cost estimates are consistent and accurate. [B,25]

U.S. EPA Response:

The estimates list the elements that comprise the total costs. The costs estimates were used to compare alternatives and have an expected accuracy between -30 to +50 percent, as discussed in the FS report, p. 4-2.

Incineration

Comment: The area allocated for incineration in each onsite incineration option as illustrated on the referenced figures appears to be substantially less than that required by available transportable incinerators with the required ancillary facilities. The area allocated is only about 250 feet by 300 feet. A much larger area is required. [B,21]

U.S. EPA Response:

Preliminary information from a mobile incinerator supplier indicated that the space selected was adequate. The actual space needs will be determined after a mobile incinerator is chosen during the remedial design. Adequate space is available on site to expand.

Comment: The FS report states "The ash content of the contaminated soil is assumed to be 70 percent; the water content is assumed to be 20 percent and the heating value is assumed to be 2,000 Btu per pound." The RI and FS reports do not present laboratory test data which are commonly used to provide data for evaluating incineration suitability and characteristics of incinerator ash. Tests for Btu content, total chlorine content, percent of ash, and NO are commonly used for evaluating suitability for incineration and should be determined prior to selecting the remedial alternative. [B,21]

U.S. EPA Response:

Incineration is suitable for materials in the landfill because the contaminants of concern present in the soils and drums are easily incinerated. Discussions with vendors of mobile incinerators verified that based on soil conditions and level of contaminants present in the soils that incineration is easily implemented. Further tests will be performed as part of the remedial design to optimize incinerator operation, as discussed in the FS report. Incineration of soils and liquid is a proven technology.

Comment: The FS report states "the volume of ash remaining is estimated to be 18,000 to 21,000 cubic yards". This represents 30% reduction in volume from the in situ volume. Since the bulk of material to be incinerated is soil with low organic content it is likely that the volume reduction will be much less than that presented and in fact may be very small. In addition, the excavated soil will undergo expansion or "fluff" resulting in a volume increase relative to in situ volume. If the ash requires treatment prior to disposal this will further increase the volume. [B,22]

U.S. EPA Response:

The incinerator ash will be disposed back into the excavated area as long as it is able to be delisted. If the reduction of volume is less than 30%, there will still be plenty of space to dispose the ash. The actual volume of materials in the landfill and soils/ash remaining after incineration can only be determined after excavation and incineration.

Comment: The FS report states "In addition to the ash remaining after incineration, residuals from air pollution control would probably consist of sludge and wastewater requiring treatment if a wet design is used and solid fly ash if a dry design is used." The issue of disposal of air pollution

control wastes should be evaluated in much greater detail prior to selection of a remedial option as this can have significant environmental and cost impact on an incineration alternative. [B,22]

No test results for total chlorine content of the contaminated material were presented. This is a critical parameter for evaluation of incineration alternatives. Since the primary contaminants include chlorinated organics the air pollution control wastes can be expected to contain significant chloride content. [B,22]

Treatment of wet scrubber waste water to remove chloride is generally not feasible and is expensive, resulting in either a concentrated brine or a high salt content solid both requiring offsite disposal. Similarly, dry scrubber systems, result in a high salt content solid. Stabilization of such solids with fly ash is likely to result in significant leaching of chloride to ground water and surface water. Disposal onsite of wastes from either wet or dry design air pollution control systems would most likely result in significant chloride pollution of Conneaut Creek potentially with considerable environmental damage. Testing of total chlorine content, calculation of chlorine mass balances for incineration air pollution control systems and evaluation of associated costs and environmental impact should be undertaken before selecting a remedial option. [B,22]

U.S. EPA Response:

The use of wet or dry scrubbers will be addressed during the remedial design. Discussions with vendors of mobil incinerators indicated a preference for dry scrubbers.

Costs associated with the air pollution control facilities are included in the capital costs associated with incineration. The actual costs are dependant on the incinerator selected.

No tests were run on total chlorine because a representative sample of materials in the landfill was not able to be obtained. As discussed in the FS report, prior to final design a test burn will be run.

Comment: With reference to incinerator ash the FS states "if delisting is not possible, the material would need to be disposed of in a RCRA landfill as discussed in alternatives E and F." Construction and operation of onsite RCRA landfill would require long term maintenance. If the waste is successfully delisted it would still remain a nonhazardous waste. Backfilling of the ash was not discussed with respect to compliance with State requirements for landfilling nonhazardous waste. [B,23]

U.S. EPA Response:

The selected remedy assumes that the characterization of the ash will allow the State of Ohio to waive their solid waste regulation regarding the final deposition of the ash. The State of Ohio has agreed to consider such a waiver when analysis of the ash is available.

Excavation

Comment: Mechanical excavation is expected to extend about 30 feet deep for all source control alternatives except containment. The contaminated material occurs within 50 feet of a very steep slope leading to Conneaut Creek. No strength data was presented in the RI/FS reports for the soil. However, stability of the excavation at such depths is uncertain. An outward failure with release of contaminated material to Conneaut Creek is a risk which has not been addressed in the RI/FS reports. Such a failure could result in far greater risk to public health and the environment than is presented by the site in its present condition. Strength data for the soil should be obtained and a geotechnical evaluation of the risk associated with excavation should be undertaken prior to selection of a remedial alternative. [B,23]

U.S. EPA Response:

Any strength data needed prior to excavation will be generated during the remedial design. During test pit excavation, the walls were extremely stable. However, if the southern wall of the landfill is not stable, the slope soils could easily be removed and stored during excavation and replaced after excavation is completed.

Comment: The FS report states "The conditions at the Big D site are favorable because the depth of drums and the drums are expected to be in generally good condition based on the results of the test pit excavation." The RI report (page 5 of Appendix I) however, states that "Over half the drums observed were either partially crushed or ruptured." The above conclusion concerning the excavation of drums is inconsistent with the test pit results presented in the RI. It should be noted that excavation of the drums would be expected to result in rupture of many of the drums which may be currently intact. [B,24]

U.S. EPA Response:

The drums observed during the test pit excavation, which were not ruptured, were in good physical condition. Excavation of these drums should not result in rupture. If drums in a less stable condition do rupture during excavation, the contents of the drum and newly contaminated soils would be collected and incinerated.

General

Comment: Instead of undertaking the dye study during the sampling period, the dye study should have been completed first so that the location of the stations could be based on the hydrodynamic flow of the creek, rather than the approach that was used where the dye study revealed that the siting of the stations may have resulted in the collection of samples in areas not representative of the flow of the creek. [B,17]

U.S. EPA Response:

The dye study was done prior to collecting samples during the second round. It would have been better to perform the dye study prior to the first round, however the data collected is still valid.

Comment: As uptake and absorption are extremely important parameters in the movement of both inorganic and organic pollutants, and as both pH and organic carbon content of soil have a major influence on the chemodynamics of the compounds, these parameters should have been measured in order to better assess the movement of these compounds in the environment. [B,17]

U.S. EPA Response:

This information would have been useful, however it was not necessary to the purpose of the RI and FS. The determination of the nature and extent of contamination and the risks posed to public health and the environment were not affected by the lack of this data.

Comment: A reference to Table 6-16 in the RI report for the ambient water quality criteria was made. No such table exists in the report. Rather, the data was taken from Table 6-9. The source of the AWQC for lead was not referenced. [B,19]

U.S. EPA Response:

Table 6-9 was the correct reference. The reference for lead is listed on page 6-52 of the RI report.

SECTION 3: SUMMARY OF OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS AND U.S. EPA RESPONSES

Comment: Alternative 9 requires that delisted ash will be backfilled into the source material excavation. The delisted ash is considered a solid waste under Ohio law and ORC 3734-02-G provides a method for the Director of Ohio EPA to determine if disposal at the Big D site would not pose any adverse effects to public health or the environment. The ROD should indicate that OEPA Solid Waste regulations are ARARs for ash disposal on-site and authority to exempt any substantive requirements of those regulations rests with the OEPA. [F,]

U.S. EPA Response:

The ROD identifies all ARARs submitted by the State of Ohio which apply to the clean-up at the site. The ROD also identifies that a request for a waiver of Ohio's Solid Waste Regulations has been forwarded to the Ohio EPA.

Comment: The FS report and the proposed plan should have considered the possibility that the incinerator ash might not meet the substantive requirements of RCRA delisting. During the remedial design, determination will be made about the treatability of contaminated source materials. If incineration does not produce a delistable ash then the ash material will have to be handled as a hazardous waste. Alternative 7 might be retained or considered as a backup for this eventuality. [F,]

U.S. EPA Response:

If the ash is not delistable, alternative 7, which entails placing the ash back in the landfill and vitrifying the ash and contaminated soils, could not be implemented, either. If the ash is not delistable then the State of Ohio's Solid Waste Regulations would require it be disposed of as a RCRA hazardous waste. Vitrification is simply another containment option and will not meet the Ohio's solid waste ARARs any more than the selected remedy will.

Comment: As noted in section 7.2 of the RI report,and as we discussed in the past, the extent of off-site migration of ground water contamination can not be verified without further sampling of ground water. The ROD should address specific activities that will occur during a pre-design project. What is the extent of the study that is needed to adequately define the extent of ground-water contamination. The ROD should include objectives and suggest methods for determining the complete extent of off-site ground-water contamination and for characterizing the hydrogeology necessary in order to design the extraction systems. Any further investigation of the extent of ground-water contamination should also be designed to address the concerns of local residents that were presented during the August 8, 1989 public meeting. Ohio EPA will provide the information that our Division of Groundwater has obtained about water usage in that area nd any well sample results that you do not already have. [F,]

U.S. EPA Response:

This has been added to the Record of Decision.

Comment: In section 3.3 of the FS report, process options for the treatment of ground water are evaluated based on effluent goals from Table 3.1. The substantive requirements of the National Pollutant Discharge Elimination System program as administered by the Ohio EPA Division of Water Pollution Control will ultimately determine the choice of treatment methodologies designed and implemented at this site. While risk based objectives are used as goals for clean-up of a contaminated site, the concentration limits for a discharge are set by the NPDES program based on the water quality of the receiving stream, flow rates, and other factors including implementation of Best Available Technology. It is likely that detailed treatability studies and design review will show that process options in addition to GAC will be required to adequately treat the ground water prior to discharge. [F,]

U.S. EPA Response:

If it is determined that further ground water treatment is necessary prior to discharge, it will be implemented, and has been noted in the ROD.

Comment: The ROD should indicate that cleanup goals will be based on cumulative risks. Though multiple exposure pathways did not pose significant risks in the RI it is possible that other risks will be documented during pre-design or later phases of the project. Any final clean-up standards should be based on risks calculated from cumulative exposure from all possible exposure routes. [F,]

U.S. EPA Response:

The ROD states that clean-up goals are based on cumulative risks.

BIGRES.TWO/2
9/27/89

APPENDIX A

Reproduced from best available copy.

Tracey Dreslinski
2349 Plymouth Gageville M.O.
[illegible]

Fire at the site ~10-12 yrs ago?

Reproduced from
best available copy.

Norman Thorpe
3709 S. Ridge Rd.
Kingsville, Ohio 44048
216 - 224-0350

We are directly south of the dump, and want our soil & water tested. No one has ever tested it.

South Ridge has no city water.

Reproduced from
st available copy.

Tim Baird
3740 Creek RD
Kingsville OH.

concerned about :
When was the last time ~~time~~
his well was sampled ? His well
was not sampled by OEPA six months ago.
56" to water table

received
8-14-89

USA 25

Name Mr. & Mrs. NORMAN THORPE

Address 3709 S. Ridge Rd.

Kingsville, Ohio **ZIP** 44048

Affiliation Self

Phone 216 - 224-0350

S-11

tairs
n St.
1

Question: We are for the Remedial Alternative # 9 & hope you can proceed to implement it as soon as possible.

Until you do start this procedure we would hope you would do more frequent water & soil testing to all parties in the immediate area, and make the tests available to them.

. Also, information should be sent to all Kingsville residents concerning this problem. Especially if there should be an evacuation.

Please send info. on the incineration process.

APPENDIX B

COMMENTS ON THE RI/FS REPORTS
BIG D CAMPGROUND SUPERFUND SITE

Submitted by:

Olin Chemicals Corporation

August 25, 1989

To:

U.S. Environmental Protection Agency - Region 5

Woodward-Clyde Consultants

Consulting Engineers, Geologists, and Environmental Scientists
2822 O'Neal Lane, Baton Rouge, LA 70896

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Olin CHEMICALS
P.O. BOX 248, LOWER RIVER ROAD, CHARLESTON, TN 37310
(615) 336-4395

VERRILL M. NORWOOD
Vice President
Environmental Affairs

August 23, 1989

Ms. Gina Weber
Office of Public Affairs (5PA)
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Attention: 5HS-11

Re: Big D Campground Superfund Site
Comments on the RI/FS Reports

Dear Ms. Weber:

Olin Chemicals Corporation retained Woodward-Clyde Consultants to review the Remedial Investigation and Feasibility Study (RI/FS) report prepared by U.S. EPA - Region V for the Big D Campground Superfund Site. This report is dated June 1989 and supplied to us under cover of Janice Bartlett of EPA's letter dated July 27, 1989.

There are significant comments on the Remedial Investigation (RI) report and serious concerns on the validity of the data used, various assumptions that were made and conclusions arrived at. The Feasibility Study (FS) report is very inadequate in that it did not evaluate all feasible alternates and for the alternates selected for further consideration, complete evaluation was not done.

Specific comments referring to individual pages in the RI/FS report prepared by Woodward-Clyde Consultants are attached hereto. We want to bring to your attention the following major technical flaws in the RI/FS reports:

- o Ground water flow and quality characterization is based on six water elevation and two sampling temporal data points over a period of only 4 months and is completely inadequate.

OLIN CORPORATION

- Review of the two ground water quality data obtained from the deep wells for RI/FS strongly suggest that contamination may have been introduced by drilling during installation of the wells.
- The data do not support the conclusion reached regarding a definite northward movement of ground water flow. The results of the groundwater model and assumptions made therein are in serious question as a result.
- Various assumptions used on the Risk Assessment are highly questionable.
- No sound scientific or technical basis for the estimate on number of drums at the site has been presented. We do not believe that the number can be anywhere near 2500 or 5000 as stated in the RI/FS reports.
- We question the design and location of the groundwater recovery trenches and more importantly the very need for the recovery trenches.
- On source control, some of the recommended alternates have not been fully evaluated. For example: the geotechnical stability of the very steep slope leading to Conneaut Creek - while excavating up to 30 feet is very questionable and could endanger the creek severely and could pose serious construction safety problems. Additionally, the pros and cons of on-site incineration were not studied in sufficient detail. To be specific, on-site incineration could lead to higher risk to the environment and public health than even a no action alternate.
- Certain very viable alternates such as in-situ solidification and stabilization were not considered.

Olin would be most happy to discuss these comments at your earliest convenience. If you have any questions, please call me at 615/336-4395.

Very truly yours,

Verrill M. Norwood, Jr. (lbr)

Verrill M. Norwood, Jr.

VMN:lbr
1167
Enclosure

cc: Ms. Janice Bartlett

COMMENTS ON BIG D CAMPGROUND, KINGSVILLE, OHIO
REMEDIAL INVESTIGATION - FEASIBILITY STUDIES (RI/FS)

INTRODUCTION

Detailed below are Woodward-Clyde Consultants' comments on Olin Chemicals' Big D site at Kingsville, Ohio. These comments have been made following a thorough review of the following documents:

(i) U.S. EPA - Hazardous Site Control Division
Contract No. 68-01-7251
Final RI Report, Big D Campground, Kingsville, Ohio
June 1989; WA 48-5LB1.1 Volumes I and II

(iI) U.S. EPA - Region V (Waste Management Division)
Contract No. 68-W8-0084
Final FS Report, Big D Campground, Kingsville, Ohio - June 1989;
WA 01-5LB1

COMMENTS ON THE REMEDIAL INVESTIGATION REPORT:

Remedial Investigation

Page ES-4:	The Executive Summary of the RI states that "Organic Compounds were detected in samples from most deep wells at low but significant concentrations. The contamination is probably the result of vertical migration of contaminants through the hard grey clay unit at localized areas or possibly the result of past site activities."

The chemical data presented in the RI for ground water from the confined bedrock aquifer raises serious concerns with respect to the validity of the RI data:

1. Validity of the ground water samples and analyses from the deep wells (those screened in the unit designated the confined bedrock aquifer) is questionable.
2. Significance of the low, inconsistent concentrations detected in the deep aquifer is doubtful.
3. Temporal patterns in the data suggest that the concentrations in ground water from the deep wells may result from residual contamination introduced to this depth by drilling for installation of the monitor wells.

4. Well development was not sufficiently defined and may not have been properly done.

The organic compounds detected (see attached Table 1) in the deep wells are primarily acetone, methylene chloride and chlorobenzene. As noted in Section 4.3.3 of the RI, acetone, methylene chloride, chlorobenzene, and toluene (also detected in some of the deep well samples) and trichlorethylene were detected in some field and/or laboratory blanks up to 305.8 ppb of total VOA's. Acetone was used as a rinse in decontamination of ground water sampling equipment. This is especially troubling since acetone is the compound reported in the highest concentrations and with the greatest frequency in the deep wells.

As stated in Section 4.3.3.3 "Acetone, a common field and laboratory contaminant was the only compound detected during both sample rounds in a single deep well." If acetone is not included, the detected total VOA concentrations in the deep wells exceed 10 ppb only in one sample (34.2 ppb in the first sample from Well 4D). The latest measurement from Well 4D was 0 ppb.

All of the wells were sampled and analyzed on two or three dates. This spanned a period of 4 months and is insufficient to make ground water quality conclusions. The data for repeated samples from any single deep well are inconsistent.For example, subsequent samples resulted in the following total VOA concentrations.

- well 1D0 to 76 ppb
- well 2D1,100 to 118 to 0 ppb
- well 3D628.6 to 48 to 0 ppb
- well 4D 71.2 to 900 to 0 PPB
- well 5D5,922 to 0 ppb
- well 6D430 to 38 ppb

In addition, dedicated sampling equipment should have been used to avoid problems of equipment contamination during sampling. Because of the presence in the blank samples of the same contaminants reported to be present in the samples and the inconsistent results from repeated samplings, the ground water sample and analysis results do not indicate significant concentrations of organics in the deep ground water. Note in the last sampling event, four of the six wells did not report any detectable VOAs. Even if the sampling and analysis results were not of questionable validity the data would not necessarily demonstrate contamination of the confined bedrock aquifer. The data for total VOAs listed above illustrate a general trend of decreasing concentration with succeeding samplings. This suggests that the detected organic compounds could be the result of contamination from shallower zones that was carried into the deeper aquifer during drilling for installation of the deep monitor wells. Repeated purging and sampling of a well would gradually reduce the constituent concentrations resulting in lower detected concentrations with repeated samplings and perhaps invalidate the conclusion that no deep contamination exists.

The data in Appendix C (see Volume II of the Final RI report), does not indicate the volume of water that was removed from each well during development and during purging for each sampling event. This information is necessary to evaluate the validity of the ground water samples.

APP.A. (See Volume II of Final Remedial Investigation Report)

P. 15

Boreholes 2D, 3D and 4D were advanced 10 to 20 feet deeper than the planned well depth. On attempting to plug the bottom of these boring cement bentonite grout rose in the borehole through the screened interval, Borehole 2D was apparently properly plugged and abandoned and the well was installed in a new borehole adjacent to the first location. Borehole 3-D, however, was drilled out using a core barrel. Borehole 4-D was flushed with water to remove the rout. The adequacy of the measures for wells 3-D and 4-D is questionable and residual grout in the wells may impact quality of water samples from these wells. The procedure used for the borehole 2-D should also have been used for 3-D and 4-D.

TABLE 1

ORGANIC COMPOUNDS DETECTED IN DEEP WELLS

Concentrations in Parts Per Billion (ppb)

	Well 1D		Well 2D			Well 3D			Well 4D			Well 5D		Well 6D	
	1st	2nd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	1st	2nd
Volatiles															
Chlorobenzene				8		2J			2.2J			82J			
Methylene Chloride						5.4			11			110J			
Tetrachloroethene												30J			
Toluene						1.2J									
Acetone		74	1100	110		620	48		26	900		5700		430	38
2-Butanone									32						
Benzene		2J													
Total Vols	0	76	1100	118	0	628.6	48	0	71.2	900	0	5922	0	430	38
Acid Ext.															
Phenol									2.4J						
Total Acid Ext.	0	0	0	0	0	0	0	0	2.4	0	0	0	0	0	0

J = Estimated value. Used when estimating a concentration for tentatively identified compounds where a 1:1 response factor is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria and the result is less than the specified detection limit, but greater than zero.

TABLE 1 CONTINUED

ORGANIC COMPOUNDS DETECTED IN DEEP WELLS

Concentrations in Parts Per Billion (ppb)

	Well 1D		Well 2D			Well 3D			Well 4D			Well 5D		Well 6D	
Sampling	1st	2nd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	1st	2nd
Base/Neut. Ext.															
Isophorone					5J									3J	
Bis (2-ethylhexyl) phthlate	2.7J										3J				
Diethylphthalate								4J							
Total B/N ext	2.7	0	0	0	5	0	0	4	0	0	3	0	3	0	0

J = Estimated value. Used when estimating a concentration for tentatively identified compounds where a 1:1 response factor is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria and the result is less than the specified detection limit, but greater than zero.

Page 3-7: (a) Northward movement of the shallow ground water is stated as fact. This is not documented and is not justified by the data in the RI. Table 3-1 (p. 3-16) shows some higher ground water elevations north of wells 1S, 5S and 4S. For example, water levels in 3S, the northern most monitor well, and RW3 (a residential well located about 600 feet north of the reported ground water divide at the site) were 712.90 feet and 719.83 feet, respectively, on September 26, 1987 and higher than the wells immediately to the south. In fact, the ground water elevation was higher in the northernmost shallow monitor well, MW-3S, than in wells to the south of it on four of the six dates on which ground water elevation measurements were reported. Ground water elevation in RW3 was 720.07 feet msl on May 16, 1987, higher than monitor wells located to the south. Furthermore, it is difficult to predict a contour of 714 feet as shown in Figure 3-3 (p. 3-8) with the existing ground water elevation data. This contour was drawn considerably north of well 3S, the northern most monitor well and the northern most data point. Also, the water level around the 712 feet contour line in Figure 3-4 (p.3-9) can be interpreted in other ways. For instance, an east-west trough could exist instead of a closed depression. In addition, the data presented in the RI is not adequate to verify that the shallow aquifer is continuous to the north of the site. Additional measuring points are necessary to define the direction of the ground water movement from the site.

(b) Paragraph 1 states that since the unusually low water table elevations in the fall do not represent normal site conditions, ground water flow systems have been discussed using May 1987 data. If this is the case, ground water flow to the north would be primarily uni-directional as indicated by Figure 3-3. This is contradictory to the two-lobed contaminant plume used in the analytical model and depicted in Figure

4-6 (p.4-19). The pattern of a two-lobed plume could be simulated under the initial condition of a two-directional ground water flow as depicted in Figure 3-4 (p.3-9). With the available data, the conclusions arrived at on p. 3-7 and p. 4-18 regarding the northward movement and the two-lobed plume are not substantiated. It should be noted that seasonal fluctuations in ground water elevation occur even in normal precipitation years and the measurements during the RI may reflect normal trends although the acutal elevations would vary from year to year. It is possible that the northern portion of the site exhibits a seasonal reversal of flow direction.

Page 4-12: The RI states that well RW-3 "is probably not screened in the same water bearing unit as the monitoring wells at the Big D site. Well construction, recharge rates, and static water level indicate this well receives water from a localized perched water table zone." The basis for this conclusion is not documented in the RI. The data presented in the RI (Table 1 of Appendix C) does not distinguish the aquifer at RW-3 from that at RW-1, RW-2, RW-4 and the onsite monitor wells completed in the water table. Table 1 of Appendix C (see Volume II of Final RI Report) lists RW-3, RW-1, RW-2 and RW-4 as screened in the overburden (assumed based on discussions with owners). No hydrogeologic analysis or other data is presented to indicate that RW-3 is not screened in the same aquifer as the other residential wells or the shallow onsite monitor wells. The ground water elevation in RW-3 is higher than in the northern most shallow onsite monitor wells and this may reflect a ground water elevation surface for the water table different from that assumed in the RI rather than necessarily indicating a different aquifer. It should be noted that the RI also indicates that the water table aquifer onsite is a perched aquifer in the over burden.

p. 4-18: (a) One of the stated reasons for the two-lobed contaminant plume is surface water recharge from the drainage swale at the northern end of the site. If the drainage swale is a significant source of recharge, the local ground water flow would be expected to be southward from the south side of the swale and northward from the north side of the swale (i.e. a ground water divide). This is contradictory to the RI's stated northward direction of the ground water movement.

(b) Residential well RW2, located at 3700 Creek Road, does not show any chlorobenzene contamination or other contamination believed to come from the site. However, Figure 4-6 shows that the computer simulation predicts that there is about 3mg/l of chlorobenzene in the vicinity of RW2. The detection limit for chlorobenzene is .005mg/l. The accuracy of the transport model is implied in the RI to be about one order of magnitude, but in this case is in error by at least a factor of 600. The assumptions on which the model is based may not be valid.

p. 4-5 Two background soil samples were collected, both from the same location. The RI then states that "As shown in Table 4-1 the highest borehole concentrations for all compounds except silver exceeded the concentrations detected in the two background samples. The highest concentrations of each inorganic compound detected in the test pits exceeded the concentrations in both background samples with the exception of antimony, arsenic, beryllium, cobalt, iron, cyanide, selenium, thallium and vanadium." These are true statements, however, it should be noted that this does not necessarily indicate elevated concentrations in the soil borings and test pits relative to the two background samples. Most of the inorganic constituents analyzed are present in varying concentrations in soil samples as a result of natural processes. The naturally occurring concentrations will vary from location to location and will exhibit a statistically distributed range of values which is dependent on the number of samples of the total population of samples which have been analyzed. That is, if the range for a very small number of samples is compared to the highest value observed from a much greater number of samples collected from the same population, it is expected that some values will exceed the range of the small number of samples. Since many more samples were analyzed from boreholes and test pits than from background locations, it should be expected that some values will exceed the range exhibited by the background samples. Note that the lowest concentrations of the borehole and test pit samples for the inorganic constituents are also lower than or equal to (for not detected) the lowest values for the two background samples.

The comparisons used and conclusions reached are statistically invalid.

p. 4-20: Soil gas concentration contours have not been provided to help evaluate the validity of the estimated extent of the ground water contamination plume, as shown in Figure 4-6 (p. 4-19). Further verification of the results is necessary.

Appendix H: (1) (see Volume II of Final RI Report) In the modeling of the plume, it has been assumed that the (water table aquifer is infinite in extent. This assumption is contradictory to the actual physical characteristics. In fact, data were not presented that verify that the aquifer is continuous in the area included in the model. Also the model did not account for the vertical recharge from the surface.

(2) The Princeton Model is limited to modeling a single source with a single ground water flow direction. The study used a combination of results from multiple model runs as a weighted average of concentration with respect to discharges from the two source areas. Theoretically, since it is not based on solute mass balance or mass conservation, the weighted average concentration may deviate remarkably from the true value at each location. It is, therefore, essential to verify the results by running other models (analytical or numerical) and comparing the results. No indication of model verification was submitted.

In light of the above, we suggest that the following be further considered:

1. Obtain water level data for additional dates and provide more data points further north.
2. Utilize another analytical model to verify the Princeton Model's results with the same given assumptions;
3. After adequate data is obtained, refine the assumptions and use other analytical or numerical models to obtain results based on more realistic physical conditions. A numerical model or a combination of analytical and numerical models is highly recommended since it can better simulate the subsurface conditions at the Big D site;
4. Sensitivity analysis of the responses of ground water flow and contaminant transport with respect to changes in the hydrogeological parameters is essential since the input values are based on assumed values and may differ very significantly

from the actual conditions. No sensitivity analysis is reported in the RI.

General comment on estimated extent of shallow ground water contamination.

The estimated extent of shallow ground water contamination to the north of the site is based solely on the predictions from the analytical model and actual ground water data are limited to the southern edge of the area modeled. Contradictions exist between the model and the available data and numerous unverified assumptions are present in the analytical model and the estimation of contaminant extent. Evaluation of the extent of contamination requires collection of actual hydrogeologic and water chemical data within the area modeled. The actual extent may vary significantly from what has been predicted in the RI, as is indicated by the available data for residential wells.

Table 1 of Appendix H (See Volume II of Final RI Report

Table 1 lists the ground water velocity used in the model as 3.64 x 10^5cm/sec. This is equivalent to about 1,030,000 feet per day. Presumably this is a typographical error. What ground water velocity was used?

Tables 6-2b, 6-3b, 6-4b,6-5b, 6-6b, 6-7b, 6-8b:

The upperbound excess lifetime cancer risk value mathematically should be reported with three significant digits to obtain more uniform calculation results.

Selection of soil ingestion rates - The soil ingestion values presented in the EPA Superfund Exposure Assessment Manual (SEAM) p. 168, Table A-5 are presented by age group and are more accurate. The information in this reference also provides time periods for various ingestion rates making the assumption of years of soil ingestion unnecessary.

p. 6-6: Direct contact with contaminated soils/Extent of exposure ...this scenario assumes that future direct contact with soils will involve soil up to 8 feet below the ground surface. The basis of this assumption (depth of 8 feet rather than surface soil) needs to be presented. Use of surface soil would probably result in significantly lower exposure. The exposure via this pathway is zero.

p. 6-8: The potential dermal exposure is estimated to be 1 mg soil/cm^2 body area. This estimate is high, a value of 0.6 mg soil/cm^2 body area is more accurate (Lepow, 1975). The value of 1 mg soil/cm^2 overestimates the health risk and this should be stated. The Superfund Public Health Evaluation Manual (SPHEM) states that the uncertainties of each assumption made during the risk evaluation process and the resulting over or underestimation of health risk must be clarified. Evaluation of the impacts of assumptions was not made for any exposure assumptions.[1]

The basis for the selection and use of an additional carcinogenic potency factor for calculating dermal exposures was not stated. The impact of the use of these factors in addition to the use of factors developed for ingestion of contaminants on the overall risk estimate was not discussed.

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[1] Lepow, M.L, et al. Envir.Res., 10 415-426 (1978).

p. 6-11: It is stated that the sampling results for the residential wells did not reveal any inorganic or organic contaminants that could be attributed to releases from the Big D site. It should have been stated that for incomplete exposure pathways there is no actual risk. (See Reference SPHEM, Page 36, first column, second paragraph). There is no potential risk associated with the site ground water at this time due to an incomplete exposure pathway. Risk is overestimated because it is assumed that the pathway is complete at this point. The potential for future risk exists only if a production well is placed in a location completing the exposure pathway.

It should also be noted that in comparing production well contaminant concentrations with site monitoring well concentrations in the same aquifer, that lower concentrations may occur in dynamic systems such as production wells in comparison to stagnant systems such as monitoring wells. The use of monitoring well data applied to production well consumption may overstate the health risk.

p. 6-12: When referring to risk, it should be clarified that the future is based on a period of 70 years for risk assessment purposes, not an infinite time period. It is stated that both acute and chronic exposures for the potential ingestion of ground water were evaluated. Only chronic hazard index values can be found on the RI.

For infrequently found contaminants, geometric mean concentrations were not calculated and the contaminant was not evaluated under probable case conditions. In order to evaluate these contaminants under probable case conditions, the geometric mean can be calculated utilizing a concentration equivalent to one-half the detection limit for that specific contaminant when there are "non-detectable" levels. This approach more accurately estimates the actual or probable exposure.

p. 6-8, 3rd Paragraph

It is stated that extrapolations from animal studies do not address human-animal differences in absorption. This is not true - all effect levels obtained from chronic animal studies are multiplied by a safety factor of 10 to account for interspecies variation.

It is also stated that the ACI and CPF calculations assume that the human body absorbs 100% of the contaminant, the same extent as an experimental animal. For most compounds this is not true.

The reasons for excluding the percent contaminant absorbed in equations 6-1 and 6-2 are not satisfactory. However, by assuming 100% is absorbed, the estimated dose is higher and the calculated risks are more conservative. Also, it was stated elsewhere that 1% inorganic and 5% organic dermal exposure assumptions would be used. These percentages are used in eq. 6-1 and 6-2 in Appendix H.

p. 6-15

The BCF values quoted for chlorobenzene range from 10 to 4185. A value of 465 was selected and the basis for this selection is not stated. A more conservative approach would be to use the highest value. Recalculations using BCF of 4185 gives a HI of 0.32 which is still in the acceptable range.

Extent of exposure - Estimated doses and HI should have been calculated for barium, lead and beryllium.

p. 6-28 The estimated dose for chlorobenzene is 9.5 E -01 not 9.21 E 01 μg/kg. (See page 6-16) The HI is 3.5 E-02 not 3.4 x E-02.

Appendix H-5 exposure dose = 10,230 mg/kg should be 10.230 mg/kg or 10,230 μg/kg

p. 4-26

Location of sampling stations based on flow of dye

Instead of undertaking the dye study during the sampling period, the dye study should have been completed first so that the location of the stations could be based on the hydrodynamic flow of the creek, rather than the approach that was used where the dye study was performed after the stations had been sited. The dye study revealed that the siting of the stations may have resulted in the collection of samples in areas not representative of the flow of the creek.

p. 5-3

Measurement and documentation of pH in the soils and water samples.

As uptake and absorption are extremely important parameters in the movement of both inorganic and organic pollutants, and as both pH and organic carbon content of the soil have a major influence on the chemodynamics of the compounds, these parameters should have been measured in order to better assess the movement of these compounds in the environment.

p. 6-8

Average body surface of child.

A discrepancy exists in the average body surface area of a child used in the risk assessment. Although EPA (1985) stated that the average surface is 1200 cm^2, the 1988 Superfund Assessment Manual (Page 127) quotes that the dermal area of a child is 9400 cm^2.

p. 6-32

Uncertainties.

The derivations and calculations of the carcinogenic potency factors and noncarcinogenic acceptable daily intake values should be discussed in more detail. In addition a discussion of the safety factors included in the calculations should be included. This information is necessary to determine the validity of the conclusions.

p. 6-37 to 6-60

Calculations

Two of the ADI values i.e. those for barium and beryllium which were used in the study differed from the values quoted in the 1986 EPA Exposure Manual. If some other source was used, it should be referenced. In the case of barium, the value differed by 11% but in the case of beryllium, the figure used, 5.00E-03, was one order of magnitude less sensitive than the value of 5.00E-04 quoted in the 1986 EPA manual. In the text it was inferred that a 1987 revision of the Toxicity data was the source of some of the ADI values. A full reference to this manual was not made as a footnote to the appropriate tables.

p. 6-57

Source of ambient water quality criteria.

A reference to Table 6-16 for the ambient water quality criteria was made. No such table exists in the report. Rather the data was taken from Table 6-9. The source of the AWQC for lead was not referenced.

Geophysics

(1) On page 4-3 of the RI report (Vol.I) landfill volumes are "estimated from the geophysical survey to be 35,000-52,000 cubic yards." There is no discussion upon which that statement is based. Later, on the same page, is the statement "based on the results of the test pit excavation the estimated volume of contaminated fill is 25,000 to 35,000 cubic yards." Were the fill estimates actually made from conversations with the transporter, from the geophysics, or from the test pits? It is not clear. The actual calculations and assumptions used should be presented.

(2) On page 7-1 of the Summary of Conclusions of the RI report (Vol.I), the statement is made "Based on the geophysical survey and the test pit excavation results, it is estimated that there are two source areas with a combined volume of 25,000 to 35,000 cubic yards." Again, supporting documentation for this conclusion was not found.

(3) In the FS report, several references to the RI report are made (pp. ES-3, 1-31, 2-5, etc.) stating "that 2,500-5,000 drums may be buried within the suspected drum boundary" inferred from the aforementioned fill volumes. No documentation correlating either the geophysical results to the fill volumes, or the geophysical results to a total number of buried drums was presented in the RI or FS reports. Again, the calculations and assumptions used to obtain this estimate should be provided. Also, the geophysical survey detects metal pieces, rods, etc., which might be present in the soil. These might influence the results to a great extent and might have erroneously been interpreted as indicating the presence of drums. The repjort makes no mention of such possible error.

Comments On Feasibility Study (FS) Report

Table ES-1 Table ES-1 indicates that alternative 6, source area containment, treatment of ground water outside contaminated area, complies with all ARARS and is protective for soils and ground water. It also indicates that it is easily implemented with proven technologies. Table ES-1 indicates that alternatives 2 and 6 have minimal risk during remediation, alternatives 4 and 8 have moderate risk and alternatives 3, 5, 7, and 9 have high risk. Alternative 6 also is indicated as requiring relatively short time to implement. Of the alternatives developed in the FS, Alternative 6 appears to have distinct advantages during the remediation when the risk for release to the air of relatively high concentrations of contaminants is much lower than for other alternatives. The only disadvantage listed for Alternative 6 relative to some other alternatives is that the long term risk (presumably of release of slow moving contaminants to ground water) is expected to be higher. Such releases can be detected by monitoring and since the ground water moves very slowly, allows considerable time for corrective measures before human exposure would occur. The short term risk of exposure to relatively high concentrations from fast moving air releases during alternatives requiring extensive excavation allows little time for response and appears to represent the greater risk to human health.

2-23 to 2-36,
3-35 to 3-37

Onsite incineration will require a high volume flow of water for operation. The discussion of incineration does not identify the source or discuss the availability of this water and the associated cost. Ready availability of this volume of water is questioned since discussion of a soil bentonite slurry wall barrier on page 3-55 indicates that water for construction of the slurry wall would have to be obtained from an unspecified offsite location. Availability of the larger volume of water for onsite incineration is thus questionable.

Figs. 3-7, 3-8
and 3-9

The area allocated for incineration in each onsite incineration option as illustrated on the referenced figures appears to be substantially less than that required by available transportable incinerators with the required ancillary facilities. The area allocated is only about 250 feet by 300 feet. A much larger area is required.

P 3-37

The FS states "The ash content of the contaminated soil is assumed to be 70 percent; the water content is assumed to be 20 percent and the heating value is assumed to be 2,000 Btu per pound." The RI and FS do not present laboratory test data which are commonly used to provide data for evaluating incineration suitability and characteristics of incinerator ash. Tests for Btu content, total chlorine content, percent ash, and NO_x are commonly used for evaluating suitability for incineration and should be determined prior to selecting the remedial alternative.

P. 3-37 The FS states "the volume of ash remaining is estimated to be 18,000 to 21,000 cubic yards". This represents a 30% reduction in volume from the in situ volume. Since the bulk of the material to be incinerated is soil with low organic content it is likely that the volume reduction will be much less than that presented and in fact may be very small. In addition, the excavated soil will undergo expansion or "fluff" resulting in a volume increase relative to in situ volume. If the ash requires treatment prior to disposal this will further increase the volume.

p. 3-37 The FS states "In addition to the ash remaining after incineration, residuals from air pollution control would probably consist of sludge and wastewater requiring treatment if a wet design is used and solid fly ash if a dry design is used." The issue of disposal of air pollution control wastes should be evaluated in much greater detail prior to selection of a remedial option as this can have significant environmental and cost impact on an incineration alternative. No test results for total chlorine content of the contaminated material were presented. This is a critical parameter for evaluation of incineration alternatives. Since the primary contaminants include chlorinated organics the air pollution control wastes can be expected to contain significant chloride content.

Treatment of wet scrubber waste water to remove chloride is generally not feasible and is expensive, resulting in either a concentrated brine or a high salt content solid both requiring offsite disposal. Similarly, dry scrubber systems, result in a high salt content solid. Stabilization of such solids with fly ash is likely to result in significant leaching of chloride to ground water and surface water. Disposal onsite of wastes from either wet or dry design air pollution control systems would most likely result in significant chloride pollution of Conneaut Creek potentially with considerable environmental damage. Testing of total chlorine content, calculation of chlorine mass balances for incineration air pollution control systems and evaluation of associated costs and environmental impact should be undertaken before selecting a remedial option.

p. 3-38

With reference to incinerator ash the FS states "if delisting is not possible, the material would need to be disposed of in a RCRA landfill as discussed in alternatives E and F." Construction and operation of an onsite RCRA landfill would require long term maintenance. If the waste is successfully delisted it would still remain a nonhazardous waste. Backfilling of the ash was not discussed with respect to compliance with State requirements for landfilling nonhazardous waste.

p. 2-29 and 2-30

Mechanical excavation is expected to extend about 30 feet deep for all source control alternatives except containment. The contaminated material occurs within 50 feet of a very steep slope leading to Conneaut Creek. No strength data was presented in the RI/FS for the soil. However, stability of the excavation at such depths is uncertain. An outward failure with release of contaminated material to Conneaut Creek is a risk which has not been addressed in the RI/FS. Such a failure could result in far greater risk to public health and the environment than is presented by the site in its present condition. Strength data for the soil should be obtained and a geotechnical evaluation of the risk associated with excavation should be undertaken prior to selection of a remedial alternative.

p. 2-30

The FS states " The conditions at the Big D site are favorable because the depth of drums and the drums are expected to be in generally good condition based on the results of the test pit excavation." The RI, page 5 of Appendix I, however, states that "Over half the drums observed were either partially crushed or ruptured." The above conclusion concerning the excavation of drums is inconsistent with the test pit results presented in the RI. It should be noted that excavation of the drums would be expected to result in rupture of many of the drums which may be currently intact.

p. 2-28 and
Figure 2-1

During screening of remedial technologies all solidification/stabilization techniques except in situ vitrification were eliminated. It appears that one technology was not considered and that other technologies were eliminated without adequate test data. The technology now exists to use large diameter augers through which a stabilization fixation slurry is pumped. The auger mixes the slurry with the waste material and contaminated soils, drums would be ruptured and the contents fixed within the slurry. This technology is not subject to the same limitations as the other solidification/stabilization technologies listed on Figure 2-1. In addition, other stabilization techniques were eliminated based on questions of effectiveness and possible leaching. Bench scale tests should have been completed prior to elimination to determine if effective treatment mixes are available.

In addition, excavation and offsite incineration of intact drums combined with stabilization of the soil and ruptured drums should be considered. It does not appear that these alternatives were considered.

General Comment	Neither the description of each alternative nor the cost estimate table for each alternative present adequate detail to determine if all essential elements of the alternative have been considered and to determine if the cost estimates are consistent and accurate.
p. 1-47:	Risks were evaluated on future site use (residential scenario). The risk associated with present use needs to be discussed.
Table 1-11a, and 1-16a:	The procedure to calculate the exposure dose is different - the intake factors defined below are not the same. Why are these values different? $\text{Intake factor} = \frac{\text{exposure dose}}{\text{maximum concentration}}$
Water ingestion and soil ingestion tables	Calculations for worst and probable case conditions for soil ingestion utilized maximum and mean concentrations as well as frequency of exposure. Calculations for worst and probable case conditions for water ingestion utilized maximum and mean concentrations and frequency of exposure was excluded. The use or non-use of a frequency factor requires explanation.
p. 1-42:	It is stated that the environmental exposure considered the most likely to occur is the ingestion of aquatic life that inhabits Conneaut Creek. No rationale was presented to support this statement, nor was the risk for this exposure route calculated. Please explain.

The rationale for including the factor frequency of contact (days) in the exposure dose equation 365 days
(6-1) is not clear. Frequency of exposure is not generally considered in calculating a hazard index.

p. 1-45 Table 1-10 WQC for the consumption of aquatic organisms only -The reference for these values was not given.

The WQC for chlorobenzene taken from a 1980 EPA reference is 7.2E-04 and 7.4E-04. The EPA manual gives a value of 488 - same units.

The WQC for chlorobenzene was quoted as 7.2E-04 μg/L for consumption of drinking water and aquatic organisms and 7.4E-04 μg/L for the consumption of aquatic organisms only from a 1980 EPA reference. A more recent reference, EPA SPHEM, 1986, gives WQC value of 488 μg/L for chlorobenzene for both consumption of aquatic organisms and drinking water and for the consumption of drinking water only.

p. 1-49 The worst case soil ingestion of $1x10^{-3}$ was selected. Is the basis for selecting this value valid? See page 6-5

APPENDIX C

OhioEPA
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Richard F. Celeste
Governor

August 25, 1989

Janice Bartlett
Project Coordinator
USEPA Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Dear Ms. Bartlett:

The Ohio EPA would like the Record of Decision for the Big D Campground Superfund Site to address the following comments. Our comments are intended to address a few outstanding concerns about the implementation of the proposed plan that have not been included in the administrative record. Alternative 9 should provide a remedy that is protective of human health and the environment if these concerns are addressed during or prior to the Remedial Design.

The four main comments below address our concerns about Solid waste issues, alternatives to delisting of incinerator ash, groundwater investigations and groundwater treatability. The fifth comment addresses risk objectives for the project.

1. Alternative 9 requires that delisted ash will be backfilled into the source material excavation. The delisted ash is considered a solid waste under Ohio law and ORC 3734-02-G provides a method for the Director of OEPA to determine if disposal at the Big D site would not pose any adverse effects to public health or the environment. The Record of Decision should indicate that OEPA Solid Waste regulations are ARARs for ash disposal on-site and authority to exempt any substantive requirements of those regulations rests with the OEPA.

2. The FS and the proposed plan should have considered the possibility that the incinerator ash might not meet the substantive requirements of RCRA delisting. During the RD determinations will be made about the treatability of contaminated source materials. If incineration does not produce a delistable ash then the ash material will have to be handled as a hazardous waste. Alternative 7 might be retained or considered as a backup for this eventuality.

3. As noted in section 7.2 of the RI and as we have discussed in the past the extent of off-site migration of groundwater contamination can not be verified without further sampling of groundwater. The Record of Decision should address specific activities that will occur during a pre-design project. What is the extent of the study that is needed to adequately define the extent of groundwater contamination. The ROD should include objectives and suggest

methods for determining the complete extent of off-site groundwater contamination and for characterizing the hydrogeology necessary in order to design the extraction systems. Any further investigation of the extent of groundwater contamination should also be designed to address the concerns of local residents that were presented during the August 8, 1989 public meeting. OEPA will provide the information that our Division of Groundwater has obtained about water usage in that area and any well sample results that you do not already have.

4. In the section 3.3 of the FS process options for the treatment of groundwater are evaluated based on effluent goals from Table 3.1. The substantive requirements of the National Pollutant Discharge Elimination System program as administered by the OEPA Division of Water Pollution Control will ultimately determine the choice of treatment methodologies designed and implemented at this site. While risk based objectives are used as goals for cleanup of a contaminated site, the concentration limits for a discharge are set by the NPDES program based on the water quality of the receiving stream, flow rates, and other factors including implementation of Best Available Technology. It is likely that detailed treatability studies and design review will show that process options in addition to GAC will be required to adequately treat the groundwater prior to discharge.

5. The ROD should indicate that cleanup goals will be based on cumulative risks. Though multiple exposure pathways did not pose significant risks in the RI it is possible that other risks will be documented during pre-design or later phases of the project. Any final cleanup standards should be based on risks calculated from cumulative exposure from all possible exposure routes.

If you have any question about these comments do not hesitate to contact us.

Sincerely,

Daniel V. Markowitz

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